ELECTRICAL REVIEW

ILLUSTRATED.

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VIEWS, NEWS AND INTERVIEWS.

Sensational cholera news has had some curious effects on people. A New York man refused to accept a cablegram until it had been fumigated.

Did you ever hear of the Florists' International Telegraph-Delivery Association? Its members are leading florists in the principal cities of the world. By a well arranged system of interchange, flowers may be ordered in one city of a member of the association to be delivered in another city at any stated time. If your fiancée is in Berlin you can order flowers sent to her by notifying a New York florist who is a member of the association.

Electricity does not yet play an important part in politics, although there are so many gentlemen interested in both. As a restorer of the peace and disbander of rowdy meetings it is, however, occasionally serviceable; somewhat, it must be confessed, after the manner of "When does a tin-tack save your life?" *Ans.:* "When you don't swallow it." The rupture of a fuse has been known to put an end to one of the longest-winded speeches that ever drew yawn; and last week, when the meeting of constituents at Northampton to protest against Mr. Labouchere's exclusion from the Cabinet grew too uproariously like a battlefield for even nature to stand it, the same timely accident sent everyone groping their way home darkly in peace.—*London Lightning.*

There will be an electrical exhibition at Milan, Italy, in 1894.

A new use has been discovered on the New York Produce Exchange for the electric fan. The blades of the fan are marked and by use of the switch which breaks the current the machine is made to perform the duties of a roulette wheel. As no by law has been found to meet this particular form of disorder, the chairman has found great difficulty in putting a stop to the sport. As soon as a group is dispersed from one fan it moves to another, where the game is enthusiastically resumed.

They have a habit of attaching notices to electric light poles with tacks in Auburn, Me. The electric light company has recently put a stop to this practice because the tacks make the linemen swear when they are going up and down the pole.

It was on a Back Bay car. At —— street she stopped the car, and, upon reaching the crowded platform, attempted to get off on the wrong side. "The other side, madam," said the conductor. "I want to get off on this side," she insisted. "You can't do it, madam," was the reply. "Conductor!" she exclaimed, indignantly, "I want to get off on this side of the car." Whereupon the polite official of the West End, in a loud voice, remarked, "Gentlemen, please stand aside, and let the lady climb the gate."—*Boston Transcript.*

A Russian physician states that superficial neuralgic pains may be instantly relieved by throwing a strong beam of light from an arc lamp on the part affected.

The emergency wagons of the West End Street Railway Company, of Boston, look very much like patrol wagons, and, when responding to a "hurry" call, seem to have the same right of way as ambulances and fire engines.

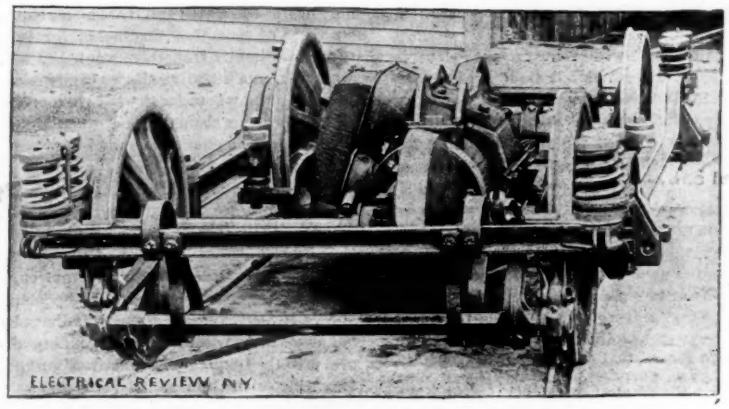
An electrical plant has been installed in a sugar factory at Bingera, Queensland.

Another electric lighting company has been established in Japan, making 12 in that country.

There are only 33 magnetic observatories in the world, and of those eight are in France and three in England. About a half have the Mascart apparatus for recording, and the others have appliances of the Kew type.

The Sperry Railway Motor.

The Sperry equipment consists of a single motor, flexibly mounted on the truck, the armature running lengthwise of the truck,



THE SPERRY ELECTRIC RAILWAY MOTOR AND TRUCK.

having a hollow shaft through which runs the pinion shaft driving both axles through bevel gears. Between this pinion shaft and armature shaft is a flexible gear. The motor is a 40 horse-power single reduction, slow speed armature. The gears are a particular design, with broad face and very strong. The housing for these gears forming the bearings for the pinion shaft, are likewise very strong and of particular design, and have proved, in practice, to be admirably adapted for the purpose. The gears on the original equipment running to-day at Youngstown are in splendid condition and have not been running in oil, though all equipments now made have gear covers, allowing the use of oil on the gears. By this method of flexible support and flexible connections is obtained the maximum tractive effect with a minimum expenditure of power, giving a single 40 horse-power motor with one armature, instead of two 15 horse-power having two armatures, giving the total weight on the wheels for traction and having the minimum weight on the wheels, without springs. The Sperry Electric Railway Company is a new company incorporated under the laws of Ohio, with its principal office at 29 Broadway, Room 173, where Mr. Harry P. Barr, the secretary and general manager is in charge.

Electricity as She Is Wrote.

In examining a number of consular reports a correspondent of the ELECTRICAL REVIEW came across some interesting specimens of "electricity as she is wrote," of which the following are samples. While the language may be described as entirely correct, it is at least a little off the usual lines and terms used by "us electricians," and our readers may enjoy the quotations.

The italics are ours.

From Consular Report No. 141, *June*, 1892, *page* 314.

"The results obtained in the use of copper bronze wire for telephone purposes have induced the imperial telephonic authorities to use only bronze wire, *which transmits the tone of the human voice better, more clearly and further than any other material*, and hence secures a more satisfactory development of the entire business."

From Consular Report No. 139, *April*, 1892, *page* 750. *Article on underground conduits in Belgium.*

"*Electric trials.*—Tests of underground lines consists in the measurement of resistance to the *conductibility* and *isolation*, and in the measurement of capacity."

"*Resistance of the conductibility.*—The measurement of conductibility is effected at the time of the reception of the cables. The operator has the two extremities of all the wires of the cable *curled*, and he determines the total resistance of the conductor thus formed by the method of Wheatstone bridge."

Resistance of isolation.—The trial of isolation is made by the method of *deviation*. Thomson's galvanometer, with mirror, is employed. The trial consists of three operations: (1) The examination of the *exactness* and *endurance* of the galvanometer; (2) the verification of the wire of communication; (3) the determination of the resistance of isolation of each conductor of the cable.

"To determine the exactness and endurance, a circuit is formed, including a pile of 50 elements Leclanche, a resistance of 100,000 ohms and the galvanometer *shunted at* 1,000 *megohms*. In admitting one volt at the *electromotor* force of the Leclanche element, and in neglecting the resistance of the pile, the result obtained, according to the law of Ohm, is" * * *, etc.

The Electric Mining Company, of Ottawa, are boring the test holes for the Prince Edward Island Tunnel, the depth of water in the Strait being in parts as much as 160 feet. It is expected to finish the test drilling by October. So far the formation has been found to be sandstone, with layers of plastic clay.

LIGHT AND POWER STATIONS.

SOME HINTS TO OWNERS AND OPERATORS BY A PRACTICAL ENGINEER.

Construct Solid Foundations for Your Station Buildings—Build the Station to Conform to the Machinery—Flimsy Work Condemned—Location of the Boiler House—Separate the Steam and Electric Plants—Account of a Plant Erected for Future Growth.

BY ROBB MACKIE.

VIII.

It is out of the question in a series of papers of this character to dwell upon all of the points that experience proves to be inimical to the proper and profitable operation of electric plants. It is not wise to try and lay down unalterable rules for the construction of the various parts of a plant, but rather to point out the bad features in those already in operation, in the hope that designers of newer plants will accept the warning and avoid the mistakes of their predecessors.

Should a full set of specifications and plans for an electrical station, prepared with the greatest care and accuracy, be submitted in this paper, it is questionable whether they would be suitable for a single station contemplated at the present time. It is wiser, therefore, to dwell upon the more important features of the buildings only, leaving the proportioning of rooms and the design of the building to those who, before undertaking such important work should be thoroughly conversant with the needs and requirements of the particular location.

In the design and plans of a building to be used as a station, particular care must be exercised to construct the foundations throughout of sufficient solidity. Much needless expense can be avoided by having these properly laid out and constructed to suit the machinery that is to be placed upon them, but it is far safer and more economical in the end to have too much material in them than too little.

Above all things, decide upon the style and size of machinery you are to put in your building before having the plans made, and once having adopted your machinery, build to conform to it. At first this will strike many as peculiar advice, but when the questions of the operation of plants is taken up, there will be some interesting information developed on this point. Do not forget that the bulk of the machinery to be operated in your building is to be of the high speed class and that in some cases it is difficult always to keep the revolving parts in good balance, hence, after a time, there is liable to be a constant jarring of the floor, and if the foundations be poor or flimsy the entire building will be seriously damaged by this constant vibration. In the cases of engines, line shafting and large dynamos, substantial foundations should be built up from the ground, for only in this way will it be possible to keep running parts in line with cool bearings and moderate lubrication.

Where the shafting and dynamos are to be

operated upon an upper floor, the walls should be almost excessively heavy and substantial, with a floor system so constructed and anchored to the walls as to make the one practically as solid as the other. In carefully constructed buildings it will then be safe to place the necessary line shafting and dynamos upon an upper floor, belting to them from engines located on the lower floor.

With solid substantial foundations and walls, buildings will be found to house the machinery to much greater advantage than where lighter and more flimsy structures are put up, for in the stronger buildings machinery will be kept in better condition with less trouble; at the same time, repairs will be kept at a minimum, whereas, in the flimsy building the repair account will reach enormous proportions, while the actual loss of revenue due to bad service directly traceable to the slipping of clutches and hot bearings, caused by the settling of the building, necessitating "shut downs" and resulting "outages," will be found to make sad inroads into the profits.

Generally, in the arrangement of the buildings, the boiler house should be located with reference to the entire layout in a manner to allow of the increase of the steam generating plant to maintain at all times a minimum distance between the boilers and engines. Careful study of this problem will result in great economy of operation.

The boiler house should also be so located that coal can be dumped at a point from which it can be readily handled by the firemen, directly from the pile into the furnaces, thereby reducing the cost of handling to a minimum. It also should be so arranged that all ashes and other refuse can be easily disposed of, with as little handling as possible.

In small plants, no worse arrangement can be conceived of than the placing of boilers, engines and dynamos in one large room. Such an arrangement should not be countenanced longer than the time necessary to build a tight partition wall, cutting the boilers and coal pile completely off from the engines and dynamos. This partition should be provided with a doorway and door, which should be kept closed at all times, except when some one is passing through. Those who are operating a one room plant will be astonished to see what a difference this partition will make in the running of the plant, for no matter what care is exercised in a one room plant, the grit of coal and ashes will get on the working parts of a dynamo or engine, with resulting "cutting" and hot boxes.

In the design and arrangement of the engine, dynamo, storerooms, offices, location of switchboard and wire tower, the same care must be exercised as has been indicated in reference to the boiler house, always having in view the extension of the entire plant at a future day. Do not be carried away by the oft-repeated claim, that the cost of building a proper station is so great as to be a practical barrier to the erection of a plant, as this is far from the truth and has led to many a costly error. It is not necessary to put up the entire structure at the outset, but a sufficient part can be erected to cover present needs, and at a future day the buildings can be extended to accommodate the increased needs of the plant. This recalls to mind a plant visited some time ago, which at first sight impressed one as one of those trials to the engineer's heart, "a temporary plant," but which upon a closer inspection proved to have been commenced as part of a building designed with a view to present economy and future growth. A brief description will be of interest.

The foundations of the front, middle and rear walls of the building had been laid in a very substantial manner and the walls put up for a frontage of about 50 feet. The rear wall of the engine and dynamo room was also the partition wall cutting off the boiler house. The foundations and setting of the necessary boilers for the first section of the plant were in place, and although an iron stack was in use, the foundations for a brick had been carefully laid and located in the proper position for use in the future for two batteries of boilers. Provision was made for a small increase of boiler capacity, using the iron stack, which was so placed, however, that the brick one could be constructed and the boiler connections transferred thereto without any interruption to the operation of the plant.

All steam pipes and connections were of ample size, and arranged with a view to future growth and increase of the plant, without any interference of the service.

The foundations for two engines and necessary shafting, etc., were built, and one engine and its complement of shafting were in operation, although running at about one-half capacity.

The flooring of the engine and dynamo room was solid and substantial, and care has been taken to so locate the pipes, etc., under the floor, as not to interfere with building of additional foundations up through the floor for special engines or dynamos.

The shafting stood sufficiently high above the floor to allow of the largest pulleys likely to be called for at any time being placed thereon, although only about one-half of the sections up were in use. Necessary clutch couplings were provided for and the work on the shafting throughout was done with a view to interchangeable running by the additional engines whenever they should be put in use.

The only temporary feature about this plant, in addition to the iron stacks in the boiler house, was the end walls of corrugated iron sheathed on the inside and so erected as to be taken down and moved. That portion of the roof over the switchboard and around the wire tower, both being of ample capacity and arranged for extension of circuits, was permanently built, but the remainder over the engine and dynamo room was built to correspond to the end walls, but in a way to allow of the building of the permanent roof and removal of the temporary one without exposing the machinery to damage by weather at any time.

In short, while the present plant is a small one, provision is made for its increase to 1,000 horse-power or 1,200 horse-power capacity without moving any of the machinery in operation, and, withal, space is allowed for the placing of a considerable amount of engine power, which could be belted or connected direct to any special generator that future developments prove to be a valuable adjunct to the types of generators now in use.

As stated above, this plant on first sight, in its present condition, seems to be a temporary flimsy affair, but a careful examination shows that every dollar has been used to good purpose just where it will accomplish the greatest permanent good. There were members of the board of directors who opposed this style of construction, who wanted to put up a temporary building and await future developments, who now, that these have come, see the wisdom of the course followed, and are now glad that the other side carried the day and put in lasting permanent construction.

(To be continued.)

Counting Coins by Electricity.

In the London Mint, says *Scientific American*, a new counting machine for telling bronze coin has been erected in the bronze store. It was designed by Messrs. Maudslay, Sons & Field, Limited. The machine has four distinct sets of counting apparatus, each of which can be worked independently of the others, and when all four are in full work, upward of 3,000 pence can be counted per minute. The coin to be told is raised to the level of two tables placed on a platform by a lift worked by an electric motor, which also drives the counting machines. A pair of these machines is fed from each of the two tables, the coins passing from the table down an inclined iron plate forming a flat hopper, from which they issue in single file through a channel of appropriate width. They are then gripped by a pair of india rubber driving wheels, which force the coins past the rim of a thin disk provided with recesses in its circumference to fit the circular edges of the coins. As the disk is thus made to revolve, the coins are pushed forward, falling into a bag placed to receive them, and continue to advance until the counting wheel is automatically stopped and the bag containing the coins is removed.

Wave Propagation in Magnetic Materials.

BY PROFESSOR FITZGERALD, BEFORE THE BRITISH ASSOCIATION.

Taking the particles as a set of magnets held in place by one another's mutual attractions, and assuming as a first approximation that the moment on any needle is proportional to the sum of its own and its immediate neighbor's rotations, then the velocity of proportion of a wave is given by

$$\lambda = 3\,l$$
$$v = 6\,N_0$$
$$= 3\,l\,N_0$$
$$N_0 = 1.6 \times 10^8$$
$$e = 10^{-7}$$
$$4.8$$
$$v = 2\,N_0\,\lambda \cos \frac{\pi l}{\lambda}$$

where T_0 is the period of vibration of each magnet when its neighbors are fixed, λ is the length of wave generated, and l is the distance between the centers of neighboring magnets, and to determine the frequency corresponding to a given wave length, we have

$$N = 2\,N_0 \cos \frac{\pi l}{\lambda}$$

From this we see that N cannot be greater than N_0, and that in that case $\lambda = \infty$, while that for smaller values of N we have the wave length decreasing until $N = O$, when $\lambda = 2\,l$, which is the minimum wave length. This last is obvious, because when the magnets are swung very slowly from side to side, each takes the phase opposite to its neighbor and, consequently, $\lambda = 2\,l$.

Thus it appears that the wave length will be very small unless N is comparable with N_0.

In order to calculate N_0, we may estimate roughly the quantities involved. If we take each magnetic particle to $l = 10^{-7}$, which, however, is too large, 10^{-8} would be probably nearer the mark; and if we assume such strengths of poles that the lines of force per square centimetre from them would be 1,000, which is much too small, we can estimate for a material whose density is 7 the moment of inertia of its elements, and the moment of each as a magnet, and thus I have very roughly estimated the time of vibration of each element, and find $N_0 = 1.6 \times 10^8$. If the elements are estimated as smaller, this frequency will be much increased, proportionally to the second power of the dimensions, so that if the size of the molecules were 10^{-8}, the frequency would be about 10^{16}. If, however, the strength of the poles decrease, there will be a corresponding decrease in the frequency, so that we must not take the calculation as anything but very rough, indeed. It would appear, however, that frequencies comparable to those of Leyden jar discharges might produce waves of measurable wave length, and that ones of a frequency comparable to that of light would probably not be propagated at all.

This agrees with Professor Dewar's recent observation that light is sensibly completely polarized by liquid oxygen, a transparent magnetic medium, and, with the fact that a strongly magnetic medium like iron seems not to have any very obviously peculiar properties in respect of the reflection of light, except those very minute, and consequently, in all probability, secondary phenomena, due to its being magnetized, and which Mr. Kern so wonderfully discovered.

It would also account for the fact that Leyden jar discharges are not too rapid to create absorption of energy by iron, and might lead us to expect that possibly liquid oxygen itself may have a corresponding powerful absorbing power for some very long waves, although it is so good a non-conductor.

It also accounts for the want of success that has attended attempts to measure, by interference, the rate of propagation of waves of low frequencies in iron, for the length of such waves becomes comparable with the inter-molecular distances, and so out of reach of the means of observation used, the velocity of propagation being very low.

These considerations would also lead one to expect that the elementary magnets could easily follow much more rapid magnetization than occurs in transformers, without any sensible change in the nature of the law. This naturally leads to the question as to how far the magnetic motions may be damped, because it may very well be that there is no free period of vibration, and in that case this investigation would fail. A comparatively slight damping of motion would stop such rapidly vibrating elements.

Time lag and inertia of induced currents viscosity—all with big currents—a viscous or diffusion phenomenon—explosions, in fact—not a wave propagation.

A Course Dinner Cooked by Electricity.

A novel banquet was recently served at the Windsor House, Ottawa, Can. The proprietor of this hotel, Mr. Daniels, invited a number of guests to partake of a dinner wholly cooked by electricity. Among the guests were Mayor Durocher, Mr. J. W. McRae, president of the electric railway, Mr. W. Y. Soper, of the Chaudiere Electric Light Company, Mr. G. P. Brophy, and several newspaper men, representing the local and outside press.

Following is the menu which was the regular bill of fare enjoyed by every guest in the house:

ELECTRIC DINNER.

Every item on this menu has been cooked by the electric heating appliances invented and patented by Mr. T. Ahearn, of Ahearn & Soper, of this city, and is the first instance in the history of the world of an entire meal being cooked by electricity.

The bread and meats were cooked in an electric oven, and the liquids in other electric heaters.

SOUP.

Consomme Royal.

FISH.

Saginaw Trout with Potatoe Croquettes, sauce Tartar.

BOILED.

Sugar-cured Ham, Champagne Sauce,
Spring Chickens with Parsley Sauce.
Beef Tongue, Sauce Piquant.

ROAST.

Sirloin of Beef and Horse Radish.
Turkey with Cranberry Sauce.
Stuffed Loin of Veal, Lemon Sauce.

ENTREES.

Larded Sweetbreads with Mushrooms.
Lamb Cutlets and Green Peas.
Strawberry Puffs.

VEGETABLES.

Potatoes, Plain and Mashed.
Green Corn. Escalloped Tomatoes.
Vegetable Marrow.

PUDDING AND PASTRY.

Apple Scouffles, Wine Sauce.
Apple Pie. Black Currant Tart. Chocolate Cake. Cocoanut Drops. Vanilla Ice Cream, Maraschino Jelly.

FRUITS.

Apples. Raisins, English Walnuts, Almonds. Watermelon, Grapes.
Black Tea. Green Tea. Coffee.
Cheese. Biscuits.

The whole bill of fare for the banquet had been gotten up in the oven at the electric car shed, during the day, and brought down to the hotel in a special car. The tea and coffee were boiled in one of Mr. Ahearn's new heaters. Everything was cooked to perfection. Even the ice cream that proved so palatable was frozen by an Ahearn heater, at least, that is what one of the electricians, of a joking turn of mind, would have the mayor believe, but the mayor smiled expansively.

After the banquet, Mr. McRae and Mr. Soper led the way to an electric car at the door and took the party up to the car shed to see the oven where the things had been cooked, and to explain the system.

The oven is of brick, about six feet wide, and somewhat deeper and about six feet high. In the lower part of the oven are two Ahearn heaters fed by a wire from the Chaudiere Electric Light Company. The beauty of the new system is that everything so cooked is done equally all through. There is no scorching in one part and half-doneness in another part. To avoid loss of heat by opening and shutting of the oven door in cooking, there are at the side of the doors peepholes, as it were, protected by heavy plate glass. The progress of cooking can thus be watched without disturbance to the articles being cooked.

Mr. Daniels is so delighted with the perfection of the electrical oven that he has ordered one for the Windsor House, and it will be in its place in a few days.

Mr. Daniels has had four Ahearn hot water heaters placed in the dining-room of the Windsor House, and in these the tea and coffee are daily prepared. The guests were delighted with the electrical dinner. Mayor Durocher said if he was kept late for the council he would explain the cause of the delay from the chair.

The Improved Wheelock Engine With Hill Valve Gear.

The Wheelock Engine Company, of Worcester, Mass., have been building for the past five years, after an experience of 30 years, the engine shown in Fig. 3. The Hill valve gear has been developed during this time and most of the Wheelock engines now turned out are equipped with it.

Fig. 1 shows the Hill valve gear complete for one end of the cylinder, having steam and exhaust valves and seats, together with all operating parts. The valves are of an elongated gridiron pattern, mounted in a

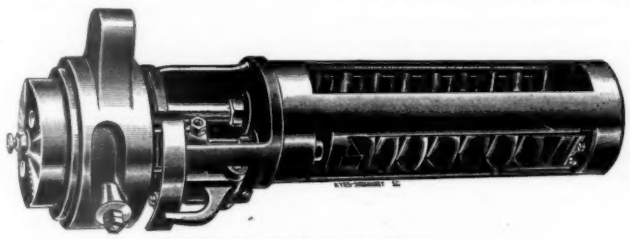


FIG. 1.—HILL VALVE GEAR.

taper plug, on the outer end of which is the driving gear, each plug carrying its entire valve gear (except the driving rod and governor connection), and also forming the single port which serves as inlet and outlet for steam. The plugs are fitted into corresponding taper holes bored in the cylinder, and are held in place by friction, the outer end of each plug being covered by an ornamental cap. The position of the plug, with reference to the cylinder, and the arrangement of valves and ports in the plug, are shown in the cross-section.

The valves have a reciprocating longitudinal movement, and are driven by cam slots in an oscillating ring operated by the eccentric, as shown in the cuts. The outer ends of the valve stems connect with slide blocks, upon which are studs carrying conical rollers, which match with and work in the cam slots. It is clear that the oscillations of the cam will impart motion to the valves in the desired direction. The exhaust valve receives a direct and positive motion, but the cut-off valve stem is not connected to the cut-off slide block direct. The latter is driven positively by the cam, and connects with the cut-off valve stem through a latch similar in function to those in general use on valve gears, but differing widely in form of application. The latch is disengaged by a tripper pivoted to the cam ring and moving with it. A regulating ring, over which the tripper is drawn by the cam ring, is provided with a cam-raise at a certain point, which causes the tripper to rise slightly when it reaches that point, thereby disengaging the latch through contact with a horn on it, which is plainly shown in the general view of the gear. The regulating ring turns freely, and is connected to the governor, thus determining the point of cut-off. It is provided with a safety cam-raise that holds up the latch and prevents the inlet valve from opening in case the governor slows down from any cause. The cut-off valve closes by the action of the steam pressure on the valve stem area.

The advantages of the Wheelock valve system are not only retained in the Hill system, but are increased. The entire valve gear may be stripped from the engine in a few minutes, and may be put back in running order as quickly. If the valves do not need to be taken out, by removing the outer bonnet and unscrewing the valve stems, the cam ring and slides can be taken off endwise entire. It certainly seems that nothing further in the line of accessibility could be desired. To quote the words of the builders, the gear is as "get-at-able as the side board of a wheel-barrow." The valve motion is an advance on the Wheelock crank and link connection with a rocking stem. One feature of the Wheelock motion is that it begins very slow and has a rapid finish, thus, by using all the available time in the stroke, gaining power to move the valve off its lap, and when fairly off, to give a quick port opening. This same motion, in greater degree, is obtained from the cams by giving the slots a suitable shape, as shown in the engraving, which permits of a very abrupt movement together with smoothness of operation. The large wearing surfaces specially adapt this valve gear to high pressures and heavy duty service. The valves are composed of short deep members, particularly adapted to resist deflection, thereby securing even wear and preventing leakage, especially if subjected to heavy pressure. The ample proportions of the valves are suggested by the illustrations, though by way of comparison, it may be stated that the latch and steel catch plate which, in the Wheelock gear, have a width of one inch, are two and a half inches wide in the Hill gear, all other dimensions being increased in about the same proportion.

Steam being taken from below the cylinder, any water of condensation in the steam pipe is prevented by gravity from going into the cylinder, and flows naturally down hill, through the inlet and outlet valves, as will be apparent by a glance at the sectional view. The inlet valve being free to lift from its seat, exposing the whole port area, will act as a most efficient relief valve in case any extraordinary rush of water should be swept by the steam current into the cylinder. Another point of advantage claimed by the builders for the arrangement of steam chest and valves shown is that there is a certain amount of mechanical separation of water from the steam entering the cylinder. Another advantage is the small clearance, which is evident from an inspection of the section. This is secured by having only one port opening into the cylinder at each end, with an area just sufficient for the exhaust and no more; by the space between the valves and cylinder being V-shaped and small as possible; and by using a piston-rod that cannot be much changed in length by keying up, so that the piston runs much nearer the head than is usually the case.

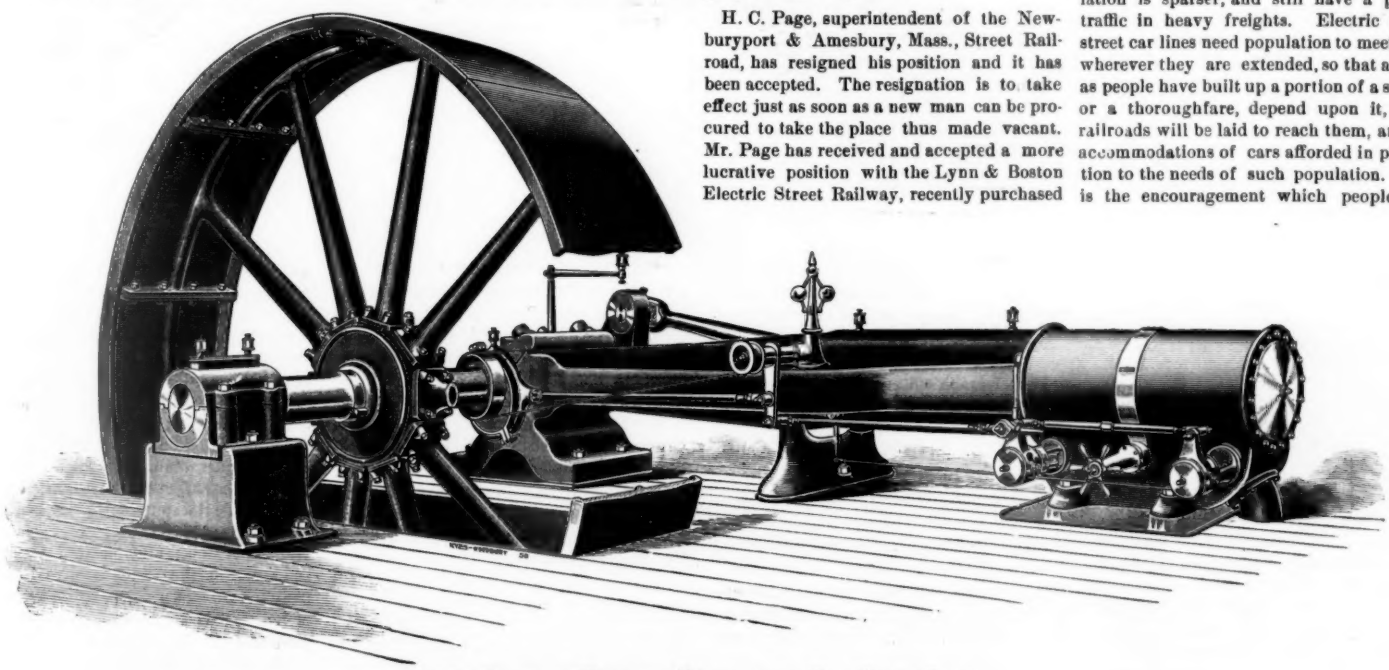


FIG. 3.—IMPROVED WHEELOCK ENGINE, WITH HILL VALVE GEAR.

ELECTRIC RAILWAY AND POWER NOTES.

Marshall, Mo., wants an electric street railway and electric light plant, both at once. Can't Marshall be accommodated?

Three patents on electric locomotives and electric railway systems, application for which have been filed since June 3, 1890, have just been issued to Thomas A. Edison.

The trolley line from Fulton Ferry, Brooklyn, N. Y., to Coney Island *via* Main, Jay, Smith and Ninth streets, was operated last week for the first time. There were no accidents.

The Kentucky & Indiana Bridge Company will commence the work of changing the New Albany, Ind., street car line to electric power as soon as the council in that city passes the ordinance.

The Galland-Burke brewery, at Spokane, Wash., is operated by electricity. Work has been completed on a 65 horse-power motor. The Edison Electric Light Company furnish the power.

H. C. Page, superintendent of the Newburyport & Amesbury, Mass., Street Railroad, has resigned his position and it has been accepted. The resignation is to take effect just as soon as a new man can be procured to take the place thus made vacant. Mr. Page has received and accepted a more lucrative position with the Lynn & Boston Electric Street Railway, recently purchased by a syndicate, of which President Odell, of the N. & A. road, is largely interested.

The Ashland, Shenandoah and Mahanoy City, Pa., Electric Railway Company has passed into the hands of a syndicate composed of Ohio and Pennsylvania capitalists. Judge Sadler, of Carlisle, retires as president, and is succeeded by J. F. Bailey, of Philadelphia. Part of the road is still under construction, and this work is now to be pushed. The company is capitalized at $200,000 in stock, with a heavy issue of bonds, for which the Union Trust Company, of Philadelphia, is trustee.

A gentleman of leisure in England has taken up dairy farming as a hobby, and, after visiting all the best dairies on the continent of Europe and securing the best advice as to machinery and utensils, has just built a dairy the like of which has never been seen. The building, which is of Carrara marble, is fitted throughout with electric light, and all the motive power for separators and churns and washing purposes is supplied by electricity. The opening of this palatial edifice

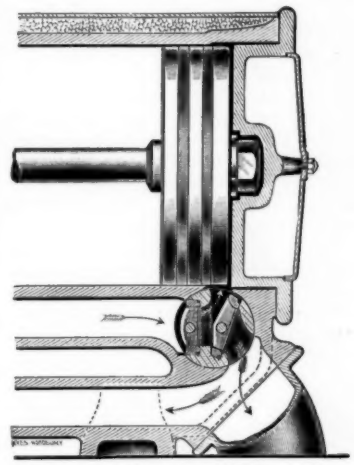


FIG. 2.—SECTION OF VALVES AND CYLINDER.

was performed by the lady mayoress of London, and is expected to make the beginning of a considerable extension of scientific dairying.

Whenever a population shows its capacity to patronize an electric railroad, or a point to which it is to be run gives promise of being developed in resources to make traffic for a carrying company of this class, it never fails to get a full share of its accommodations. With freight carrying railroads the case is different, because such common carriers can run through vast areas of cultivated lands and developed mines, where the population is sparser, and still have a paying traffic in heavy freights. Electric motor street car lines need population to meet them wherever they are extended, so that as soon as people have built up a portion of a suburb or a thoroughfare, depend upon it, street railroads will be laid to reach them, and the accommodations of cars afforded in proportion to the needs of such population. This is the encouragement which people now have to stimulate them in extending the streets of cities, and of going beyond their limits to organize colonies to found villages. Street car managers are on the lookout for such customers all the while and never permit them to suffer any length of time for accommodations in their way of business. No matter, then, how far out people may locate on the line of any of the main streets of the city of Harrisburg, or beyond their limits, just as soon as they show sufficient numbers to warrant the extension of an electric motor line to reach them, they will be supplied with its facilities of travel. It is not be wondered at, therefore, that cities now rapidly increase in population and enlarge in improvement. — *Harrisburg, Pa., Star-Independent.*

On the Dielectric of Condensers.*

BY W. H. PREECE, F. R. S., BEFORE THE BRITISH ASSOCIATION.

Artificial cables are very useful adjuncts to the laboratory of the telegraph engineer. They not only enable him to experiment at his leisure, but they form very useful means to test and compare high speed and delicate telegraph apparatus, and especially telephones. I have one, made some years ago, which has been in incessant use, composed of 54 inductionless coils of insulated copper wire, each giving 33 ohms resistance, and having a condenser of one microfarad capacity at the juncture of each pair of coils. This represented a circuit of a total capacity (K) of 54 microfarads and of a total resistance (R) of 1,188 ohms. The K R being 64,152. This was equivalent to an ordinary submarine cable of 162 nauts length. It was not sufficient for our growing wants, and another precisely similar set was recently made of the same dimensions and materials and in the same way. But it did not give the same results. The resistances were exactly the same, but the individual capacities differed so much that the total capacity for the same surface of foil was 60 microfarads, instead of 54, so that the K R was 71,280. This difference, of nearly 11 per cent., was, of itself, of no practical consequence for the particular purpose for which the cable was constructed, but on carefully comparing the two "cables" with telephones, it was found that with the same nominal K R the new one gave 30 per cent. better results than the old one; that is, with the same nominal K R and the same telephones, speech would be 30 per cent. clearer on the new "cable" than on the old one. The limiting distance of speech would also be 30 per cent. greater on the new one. This was a surprising and unexpected result. I thought it might be due to inductance, but none, neither *self* or *mutual*, could be detected.

The insulation, taken after one minute's electrification of each, was:

Old cable, 172.8 megohms per naut.
New " 82.8 " " "

so that the difference was in favor of the old one. But the electrification of the new one was much superior to that of the old one. The difference in the resistance reading between the beginning and ending of the first minute on the former was $\frac{1}{10}$ of that of the latter.

Each cable was then rapidly charged and discharged 1,200 times, at varying rates, with an electromotive force of 40 volts, and the cumulative remaining charge in each case read by reflection on a Thomson galvanometer. This was done by passing a 10-feet length of perforated slip through a Wheatstone's automatic transmitter. The following are the results:

Number of discharges per second.	Discharge.		Percentage difference.
	New.	Old.	
20	46	28	39
40	86	55	36
80	151	100	33
120	200	136	32
160	237	168	29

This clearly shows that the effect is due to absorption. Electrification, polarization and absorption are phases of electrolytic work done by the current upon the dielectric. The material is slightly decomposed by the leakage current, a counter electromotive force is set up, which reduces the apparent resistance (electrification); it gives a current of discharge reverse to that of charge (polarization); it absorbs a quantity of electricity, the undissipated part of which is recovered as a discharge current. The condenser acts, in fact, like a secondary cell.

We are now using better paper than formerly—that made from the best linen rags, thinner tinfoil and better wax—the best refined unadulterated white paraffine, having a melting point of from 125° to 128° Fahrenheit. Resin was formerly mixed with the wax, and when hot and liquid it was painted on the paper with a brush. The paper is now thoroughly dried, and well saturated with wax, by soaking under pressure, so as to get rid of all the moisture. Hence, there is less electrification and less absorption, and consequently less retardation, and hence the superiority of the new "cable." In the old type of condenser we observed a variation of capacity, due to temperature; but in the new type this has disappeared. This effect of absorption on the effective capacity of the condensers and of insulated conductors, is new to me, and as it may be new to many others, I have thought it to be of sufficient interest to bring it before Section A.

It is a new term to be added to the equation of energy of compound circuits, and it has evidently a material influence upon the retardation of signals in long submarine cables. It has an equally important influence on the efficiency of the telephone circuits, and it accounts partially for the great difference in my K R law between the observed effects of aerial and those of subterranean or submarine conductors. The former are always much superior to the latter. This would be due to the absence of polarization in air as well as to other electro-magnetic and electrostatic causes. No work would be done on the molecules of air; no energy would, therefore, be absorbed, and no retardation of currents from this cause would ensue. An air dielectric is clearly the "Holy Grail" of the electrician.

* Lord Kelvin proposes to call this useful instrument a "Leyden," because the term "condenser" is applied to other more appropriate mechanical and physical apparatus.

TELEGRAPH NEWS.

The telegraph office at Terre Coupee has been closed and a night office opened at New Carlisle, Ind.

A telegraph line is being established down the east coast of Florida, by the J., St. A. & I. R. Railroad.

Sixteen men are putting four more copper wires on the Postal telegraph line between Boston and New York.

Telegraph offices have been discontinued at Codell, Zurich and Palco, Rooks County, Kas., towns on the line of the Salina and Western Road.

Henry C. Hope, superintendent of telegraph of the Omaha Railway Company, of St. Paul, Minn., is heir to an estate in the North of Ireland worth several millions of dollars.

The Western Union board of directors declared 1¼ per cent. regular quarterly dividend on September 14. Net revenue September 30, quarter, 1891, $2,000,000, this year $2,200,000. Board voted to increase the capital to $100,000,000; stock to issue as directors decide.

The telegraph line contracted to be built by the B. and O. R. R. from Marlboro to La Plata, Del., is in course of erection, a force of hands under J. T. Young, of Wilmington, Del., now being at work on it, and 26 miles of the line will be completed and in operation by October 1, thus giving the country quick communication with the outside world.

The suit of the city of San Francisco against the Western Union Telegraph Company for taxes for the year ending June 30, 1886, has been decided by the Supreme Court adversely to the city. The suit was over the taxes on the franchise of the company, no contention being made as to the right to tax the property. The franchise was assessed at $50,000.

The Bible sometimes makes a good telegraph code. Thus, recently, the editor of the *Christian Register*, finding it would be too late to send a letter of congratulation to the London *Inquirer* in regard to its jubilee, sent a telegram by cable as follows: "Third epistle of John, 13–14," which, being interpreted, read as follows: "I had many things to write, but I will not with ink and pen write unto thee; but I trust I shall shortly see thee, and we shall speak face to face. Peace be to thee. Our friends salute thee. Greet the friends by name."

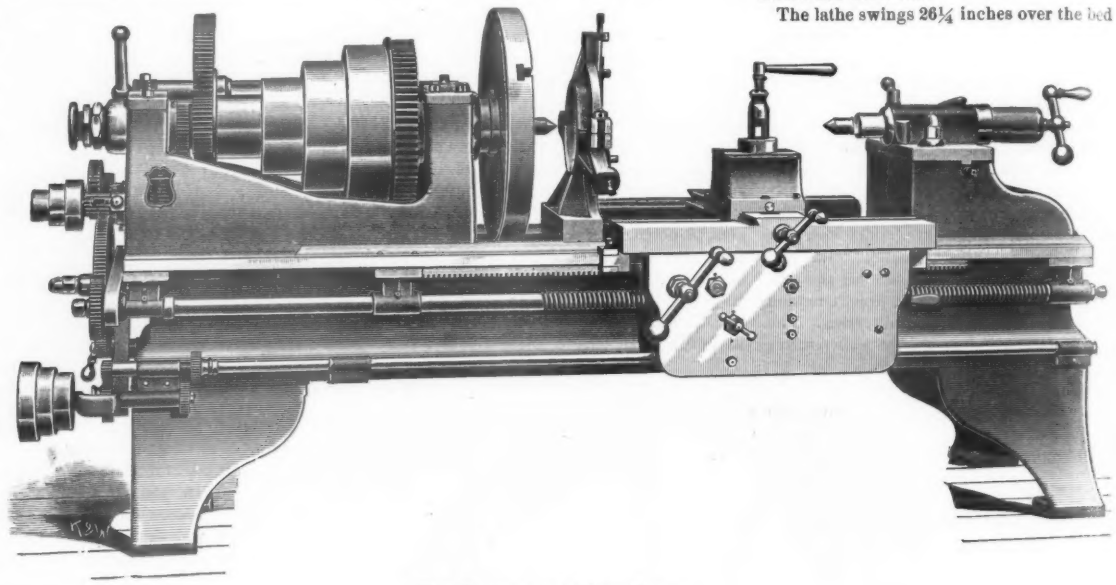
The question of long distance telegraph circuits was being discussed in the Lake Shore office this morning, when one gentleman related an incident which is rather peculiar to those unacquainted with the mysteries of the telegraph craft. He related the circumstance of a man who "talked" over a wire 3,000 miles long and had his request for a chew of tobacco granted within 30 seconds. The first named operator was at one end and his partner "Jack," at the other end of a complete circuit from Chicago to New York. They were separated merely by a glass partition, yet the request for a "chew" was flashed over 3,000 miles of wire.—*Elkhart, Ind., Truth.*

In order to relieve the Titusville International Ocean Telegraph office of the extra work, and give the cable office at Jupiter, Fla., the business where the force is better able to handle it, all transfer business will now be sent *via* Jupiter, instead of coming through Titusville, as has been done since the government line was built. This will relieve the Weather Bureau office of a great amount of work, as well as the International office. The messages will be handled direct from the government line to the cable office, and will give better service, as no delay will be occasioned in transferring messages. This change was made by Mr. B. F. Dillon, superintendent of the International Ocean Telegraph Company at Jacksonville, and went into effect September 1.

Barney Hughes, a well-known citizen of Memphis, Tenn., died there on September 3. Mr. Hughes was 53 years old. He was of Irish descent, and was reared in Louisville, Ky. He studied the Morse system of telegraphy, and is said to have been the first man to take telegraph messages by sound. He came to Memphis before the war and, when Tennessee seceded, went out as a telegraph operator in the service of the Confederacy. After the war he returned to Memphis and was employed as an operator by the Memphis & Charleston Railroad Company. He remained in the service of that corporation until his death, although numerous changes were made in the ownership and management. He worked his way up from operator to conductor, then to ticket agent and finally to commercial agent, which responsible position he made vacant by his death. He was a man of great sagacity, a large fund of information and remarkable powers of observation and adaptability. An instance of his faculty of acting promptly and intelligently under trying circumstances is related of him while he was conductor on a Memphis & Charleston train. His engine met with an accident between stations, and there was a limited express coming behind him. He cut the telegraph wire, improvised a ground connection and ticker, and sent a message to have the express train stopped. He then caught an answer by applying the end of the wire to his tongue.

P. Blaisdell & Company's 24-Inch Lathe.

P. Blaisdell & Company, 62 Jackson street, Worcester, Mass., are large and well known manufacturers of machinists' tools. Among their products is a 24-inch lathe, which is illustrated herewith.



THE BLAISDELL 24-INCH LATHE.

The lathe swings 26¼ inches over the bed and 16⅝ inches over the carriage. The cone is 17 inches, 13½ inches, 10 inches and 6½ inches diameter, 4¼ inches face. The face gear on spindle is 18½ inches diameter, cut two to the diametrical pitch. The cone makes 15 revolutions to spindles one with the gears in and the speeds are so arranged that in changing from open belts to gears the speeds are uniform. The front bearing is 4¼ inches diameter, 7 inches long; the back bearing 2⅞ inches diameter, 5½ inches long. Hole in spindle 1⅞ inches diameter if desired. The centers are made of the best Jessops cast crucible square steel, size and taper of the Morse Twist Drill Company's No. 5 socket. The spindle is of hammered cast crucible steel about 60 points carbon.

The feed is driven by a rod with belt or gears and is so arranged as to get from 84 to the inch to 2 to the inch. The Vs are broad and the carriage is planed on deep, having a bearing of ⅞ inches on Vs and 32 inches long. Taper attachment and compound rest when required, large face plate, full swing of lathe.

The lathe is furnished with friction countershaft, center rest and full set of change gears to cut all threads from 2 to 12, and all the even threads from 12 to 22.

The bearings and all sliding surfaces are scraped to a perfect fit. They are made to turn and bore straight, and the carriage to turn up perfectly true, in fact, the material and fits are all warranted to be first-class. These lathes are from new patterns and latest design. The weight of a 12 foot bed is 5,400 pounds.

MEDICAL ELECTRICITY.

On the Electromotive Phenomena of the Mammalian Heart.

EDITED BY DR. J. MOUNT BLEYER, NEW YORK.

This original physiological research was carried out by the two physiologists of the London University, Bayliss and Starling, and the results communicated to the Royal Society. The methods of research were as follows:

The heart being exposed, two points of its surface were connected by means of non-polarizable electrodes with the terminals of a capillary electrometer. An image of the meniscus was thrown on to a moving photographic plate, on which were also recorded the contractions of the ventricle, a time tracing (8 or 100 per second), and in many cases the time of stimulation (when artificial stimuli were used), or the period of excitation of the vagus (when it was desired to slow the heart). In nearly all these experiments dogs were used.

Experiments were also carried out on the excised heart. In these, the heart, immediately after the chest was opened, was placed in a warm moist chamber. The wires of the electrodes and the tube going to the tambour recording the heart-beats passed through holes in the sides of the chamber.

THE RESULTS.

As to the wave of negativity in the ventricle, it is found that in animals whose hearts are in as normal a condition as possible this variation is always diphasic, the negativity at the base preceding that at the apex. The result is the same, whether the pericardium be intact or opened, or whatever points of the ventricular surface are led off.

The character and direction of this variation, however, are exceedingly sensitive to slight changes in the temperature of the various parts of the heart, so that in order to obtain a constant result in animals, with opened chest, it is necessary to use warmed air for artificial respiration.

The following experiment illustrates the sensitiveness of the direction of the electrical variation to changes in the temperature of the respired air:

Dog: Operation as already described; artificial respiration with warmed air. Base of right ventricle, anterior surface, to acid, apex to left ventricle to capillary.

DIRECTION OF VARIATION.

(*a*) Before opening pericardium, diphasic base, apex.

(*b*) After opening pericardium, diphasic base, apex.

The hot water was now poured out of the vessel surrounding the spiral, and this was filled with ice. After five minutes another photograph was taken of the variation.

(*c*) Triphasic, base, apex, base.

(*d*) After another five minutes, diphasic, apex, base.

(*e*) The ice was now replaced by hot water.

After 10 minutes more, the variation was found to be once again diphasic, the base becoming negative first. Cold air was then used again, with the same result as before.

The same reversal of the variation can be obtained in the tortoise's heart by warming the apex and cooling the base simultaneously.

Now, if we may regard the electrometer tracings as reliable, that is to say, if the variation, apex, base, with cooled base is the variation, and it is not really a diphasic one, with a first phase too small to be read on an electrometer, the very conclusion that can be drawn from such experiments is that the excitatory wave in the ventricle is a different thing from the wave of negativity, and precedes it (since in the beats with cooled base, although the ventricles were beating in normal sequence to the auricles, the negativity began at the apex before the base).

Possibly, in the ventricles, the excitatory state is not transmitted directly from one muscle cell to another, but by the intervention of the inter-muscular network of nerves, shown by Dogiel, Openchowski and others, to be universally present in the ventricular walls.

FINE MEASUREMENTS.

Some point of the auricles or ventricles was stimulated three times a second by means of an induction shock. In this way an artificial rhythm is induced, the heart contracting to every stimulation. This is the only method by which it is possible to get time measurements in the mammalian heart, since we cannot put this organ into a prolonged standstill, as we can the frog's heart, by means of the staminus ligature.

The latest period of electrical response of auricular and ventricular muscle to direct electrical stimulation is so short that it could not be measured accurately with the means at their disposal. It is said to be certainly less than 0.01 inch.

These experimenters have sought to measure the rapidity of propagation of the wave in the mammalian ventricle in the same way

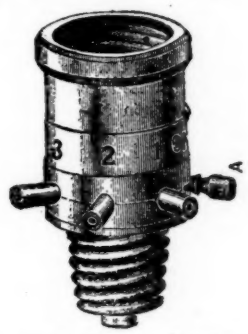


FIG. 1.—AN INGENIOUS CURRENT TAP FOR MEDICAL USE.

as Engelmen and Sanderson and Page estimated it in the frog's heart; namely, measuring the time interval between the beginning and the culmination of the initial phase.

In the exposed heart of a dog, breathing warmed air, the rate is generally about 30 millimetres in 0.01 inch, *i. e.*, about three metres per second. But the sensitiveness of the form and direction of the variation to slight changes in temperature of different parts of the heart surface must have made them hesitate in taking these figures as the correct ones.

There is a long period of delay in the passage across the ariculo-ventriculo groove. A mean of eight observations gave 0.15 inch as the time elapsed after stimulation of the auricles before the development of negativity at the base of the ventricles. Nearly the whole of this time is taken up in the passage from auricles to ventricles, since it makes very little difference to the time interval whether the stimuli be applied to an auricular appendage, or the auricles close to the aurico-ventricular groove.

Lastly, was obtained no evidence of the supposed tetanic nature of a cardiac contraction (Fredericq), all their results pointing conclusively to the contraction being a single wave, starting at the base and passing thence to the apex of the heart.

The conclusions arrived at by Sanderson and Page in their work on the heart of the frog and tortoise, hold good also for the mammalian heart.

ON THE ELECTRICAL VARIATION OF THE HEART OF MAN AND THE INTACT DOG.

These same researches also photographed the electrical change of the heart of man and of the dog, with chest unopened, and, in opposition to Waller, found that the variation is of such a nature as to show negativity always commencing at the base of the heart. The greatest effect was obtained by leading off from the apex beat and the right hand, but they found the same character of variation from whatever points on the surface of the body it was led off, *i.e.*, the electrode nearest the base became negative first.

The photographs show what the eye could not distinguish clearly, viz., that each beat is accompanied by a triphasic variation, consisting of, first, a "spike" (basal negativity); second, a more prolonged excursion in the opposite direction (apical negativity); and third, a larger and prolonged movement in the same direction as the "spike" (basal negativity). Hence it was concluded that the *base becomes negative before the apex*, and that its negativity overlasts that of the apex.

They do not, as yet, feel able to explain the triphasic nature of the variation; it shows, however, that naturally the excitatory state at the base of the heart lasts longer than the apex.

BLEYER.

A MOST INGENIOUS NEW CURRENT TAP FOR ALL MEDICAL AND SURGICAL USES.

Electricity is fast emerging from the chaos which has surrounded it since it began to be a feature in the treatment of disease, and this increased use of electricity has been the occasion for the invention of numberless devices tending to a greater facility in its application. The methods heretofore in use have all been those made possible by the use of the ordinary galvanic battery. But the latter's liability to get out of order has made it anything but a perfect medium of application. It is a most unique method for the administration of the galvanic current in using it directly from the incandescent light wires. When means for its proper reduction to within limits insuring the safety of the patient are employed, it is, by reason of its economy and absence of trouble, much more to be preferred than the old style of battery systems. Yet the means heretofore used have not been such as to positively eliminate every danger.

In the cut (Fig. 1) is shown a contrivance which, when used in connection with a proper controller, will tend to simplify matters and render this means of obtaining current safe even in the hands of a novice. An incandescent lamp socket is so modified with tapping sockets and a switch as to make it possible to obtain either a current with the lamp in series or one in which all resistance is thrown out and which can be used up to the amount allowable by the safety fuse plugs. The last condition would only be of use where a force sufficient for motor or drill work was desired. Sockets one and three are then tapped, and an external resistance used to modify the current to the right proportion. For actual therapeutic use the sockets marked one and two are used, and the current guarded by the

FIG. 2.—INSTRUMENT USED WITH VETTER CURRENT CONTROLLER.

resistance of the lamp which is then in circuit will never be able to gain in strength above one-half ampere at 110 volts, a proportion well fitted for medical treatment. Fig. 2 shows the instrument used in connection with the Vetter current controller and milliampere meter. The controller mentioned was described in a former issue, but furnishes a means of modification which, when used in series with the instrument described above, will make an outfit for the physician which is very desirable.

ELECTRO-DIAGNOSTICS.*

Under this heading, in the editorial column of the *Electrical Review*, of London, appears an editorial which was founded upon some experimental researches made by Von Frey on the electrical resistance of the human body, and alluded to the modification of Kohlrauch's method of determining the resistance of electrolytes by means of alternating currents and the telephone which was employed in the investigation. It says: "This method must still further be modified if it is to be applied with success to electro-diagnostics. In such operations a very small electrode is always employed, thence the metal rheostat may be advantageously replaced by a liquid one, consisting of platinum in sulphuric acid, the immersed metal surface being very small. There must be a definite ratio between this surface and the surface of the skin touched by the electrode in order to produce a cessation of the tone in the telephone, this is when the displacement of phase of the electrical vibrations is to be equalized. The graduation of the rheostat is a somewhat difficult matter, and is, of course, only available for a certain range of strength of the current. The surface necessary varies with the region of the body operated upon, and the latter must be thoroughly moistened by immersion in troughs through which the current is passed by cleanly polished zinc plates. The resistance of the body from hand to hand is very small, and, as might be expected, independent of induction currents."

* Pertaining to electro-diagnosis.

History of the Atlantic Telegraph.

Through the kindness of Dr. Henry M. Field, editor of the *Evangelist*, we are enabled to publish below the preface to the new edition of his "History of the Atlantic Telegraph."

The recent death of Mr. Cyrus W. Field recalls attention to the great enterprise with which his name will be forever associated. "The Atlantic Telegraph," said the late Chief Justice Chase, "is the most wonderful achievement of civilization, and entitles its author to a distinguished rank among public benefactors. High upon that illustrious roll will his name be placed, and there will it remain while oceans divide, and telegraphs unite, mankind." The memory of such an achievement the world should not let die. The story of its varied fortunes reads like a tale of adventure. From the beginning it was a series of battles, fighting against the elements and against the unbelief of men. This long struggle the new generation may forget, recognizing the success, but thinking little of the means by which it was attained. What toil of hand and brain had gone before; what days and nights of watching and weariness; how often hope deferred had made the heart sick; how year after year had dragged on and seen the end still afar off—all that is dimly remembered, even by those who reap the fruits of victory. And yet in the history of human achievements it is necessary to trace these beginnings step by step if we would learn the lesson they teach, that it is only out of heroic patience and perseverance that anything truly great is born.

Twelve years of unceasing toil was the price the Atlantic telegraph cost its projector; and not years lighted up with the assurance of success, but that were often darkened with despair; years in which he was restlessly crossing and recrossing the ocean, only to find on either side, worse than storms and tempests, an incredulity which sneered at every failure, and derided the attempt as a delusion and a dream. Against such discouragements nothing could prevail but faith, or fanaticism, which, believing the incredible, achieves the impossible. Such a tale, apart from the results, is in itself a lesson and an inspiration.

In attempting to chronicle all this, the relation of the writer to the chief actor has given him facilities for obtaining the materials of an authentic history; but he trusts that it will not lead him to overstep the limits of modesty. Standing by a new-made grave, he has no wish to indulge in undue praise even of the beloved dead. Enough for him is it to enroll the canvas on which the chief actors stands forth as the conspicuous figure. But in a work of such magnitude there are many actors, and there is glory enough for all; and it is a sacred duty to the dead to recognize, as he did, what was due to the brave companions in arms, who stood by him in disaster and defeat; who believed in him even when his own countrymen doubted and despaired; and furnished anew men and money and ships for the final conquest of the sea. If history records that the enterprise of the Atlantic telegraph owed its inception to the faith and daring of an American, it will also record that all his ardor and activity would be of no avail, but for the science and seamanship, the capital and the undaunted courage, of England. But when all these conditions were supplied, it is the testimony of Englishmen themselves that his was the spirit within the wheels that made them revolve; that it was his intense vitality that infused itself into a great organization, and made the dream of science the reality of the world. This is not to his honor alone; it is a matter of national pride; and Americans may be pardoned if, in this year of Columbus, they recall that it was one of their countrymen whom the Great Commoner of England, John Bright, pronounced "the Columbus of our time, who, after no less than 40 passages across the Atlantic in pursuit of the great aim of his life, had at length by his cable moored the New World close alongside the Old."

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The ELECTRICAL REVIEW is in receipt of an inquiry for the address of the inventor of an "electrical reciprocating tool for sculptors." Will the inventor please step forward?

The distribution of small units of power from central stations is beginning to assume important proportions. Electric power is now used for operating anything from a dental drill to a rock crusher.

It is understood that the electrical decorations of New York city on the occasion of the Columbus celebration next month will be superb. New York has the money and the talent to make a fitting celebration of this historical event.

Electric heating and cooking are among the many problems now being worked out by electrical inventors. The advantages of these systems are far beyond those of oil, coal, or steam systems. The question of economy is the all-important consideration.

THE CHOLERA.

The cholera has appeared in New York city, but there will be no epidemic. The manly and prompt action of Governor Flower, and the quarantine and sanitary precautions observed by the health authorities under Health Officer Jenkins, will prevent the spread of the disease. As fast as sporadic cases are discovered they will be isolated and the infected house will be fumigated and quarantined.

Don't leave New York.

Don't be afraid to come to New York.

This is the best protected city, from a sanitary point of view, in the country.

Go about your business with a light heart, observe the following precautions and you need not fear the cholera:

Don't get frightened. Many people die of fear whom the cholera alone would not kill.

Keep clean. Rinse out the nose and mouth and wash the hands before eating. The cholera germs are dangerous only when they get into the stomach.

Eat only thoroughly cooked food. Drink no water that has not been boiled. Abstain from milk, butter, cheese and raw fruit.

If you find you have contracted even the slightest diarrhœal trouble, go to bed at once and send for the nearest physician.

HOIST BY ITS OWN PETARD.

The New York *World* has for months been publishing articles, under "scare" headlines, of course, in opposition to the trolley system. It has thus put forth column after column of the veriest trash trying to prove that the accidents which have occurred on electric railways were due to the "pernicious and death-laden trolley." In a recent article in these columns the ELECTRICAL REVIEW doubly punctured this bubble of the sensation-mongers of the daily press.

Recently, however, the *World* has made a discovery. It has unearthed the fact—long known to all electric and horse railway managers—that there has been a small railway operated in Massachusetts for a year past on the storage battery system, and for its size operated with seeming success. Forthwith the *World* wants it introduced as the motive power on the enormous street railway systems of this city. It seems that everyone but the *World* remembers that "consistency's a jewel," for it now advocates what a few days ago it condemned in the strongest terms, and it gives no reason for its mental conversion. Its long list of accidents which have happened in the flitting of the trolley cars has been proved to be almost exclusively made up of mechanical mishaps. Will the *World* kindly tell us how these are going to be avoided when the motive power is the same as in the cases condemned by it? The motors are electric, the speed is that demanded for rapid transit and, therefore, practically the same as in the trolley system, the methods of control are not different in the two systems. How, then, does the *World* expect to reduce the roll of casualties? Has it discovered some new *kind* of electricity which will of its own accord throw people out of the way before the wheels can touch them? Will this wonderful new current of dynamic manifestation suddenly put forth an iron hand and drag back into safety the fool who is about to jump backwards off the car? Will it reach out a motherly hand and slipper and soundly spank the danger loving urchins who want to steal a ride? If yea, then it can do more. The *World* has indeed hit upon a gold mine, and we trust, for the good of science and honest criticism, that a modicum of this wonderful new current will forthwith be infused into the scientific (?) articles from time to time written by or for the *World*.

In all this we mean no disparagement of the storage battery. Whether or not it is capable of successful operation in a large city railway is a mooted question, which can best be determined by those whose capital is seeking for the best it can find. We have little doubt that some day the storage battery will come more aggressively into the field of railway traction. But if it has come, or is to come, it can in no wise put any different complexion on the casualties which always have happened and always will happen to any system of rapid transit, as long as people are careless of their own safety. Let us have more consistency from the daily press and less sensational and misleading rot.

THE STERILIZATION OF INFECTED AND OTHER SEWAGE BY MEANS OF ELECTRICITY.

One of the adages says: "In time of peace prepare for war." Several years ago a scheme was put forward by Mr. Webster, of England, at one of the British Association meetings, to attempt the solution of one of the sanitary problems of the day by employing electricity for its purification. Such experiments were undertaken by several scientists, as Mr. Salford and Mr. Webster. These investigations showed that the suggestions then made were most feasible. Possibly it is due to the cost that nothing more has been heard from such undertaking, but certainly in these days of progress such a matter of vital importance as the disposal of contaminated sewage, a fractional difference in cost ought not to play any role when we take into consideration the number of lives that are at stake. Quite recently, at the meeting of municipal and county engineers, at Nottingham, during the discussion of papers one gentleman expressed wonder that factories should be allowed to empty their waste products into the sewers without any attempt at purification. He thought that at any rate these products should be partially purified, before having to be dealt with, wholly at the ratepayer's expense. It seems to us, that the wonderment of this gentleman is quite in place, and it really is inconceivable that factories and all kinds of manufacturers who produce waste material, of such kinds that are unhealthy, should be allowed to get rid of their waste products in such a way as is now in vogue.

Mr. Webster's process of purification is as follows: He puts electrodes in his liquid sewage, generates large quantities of oxygen, and so brings the oxidizable matter into contact with free nascent oxygen (ozone) in a very short space of time. The result is said thus far to be exceedingly satisfactory. Now, what is to hinder us applying the Webster process, to be made use of at all hospitals, institutions, factories and quarantine stations, etc., and thus apply it to the waste liquid products and infected materials arising before those waste products are allowed to enter the public sewers? If this can be practically done, then, instead of having to deal with contaminated liquid, no doubt, it would be possible to pass the purified liquid through the surface drains, and let it run direct to the water ways in small towns and villages where the drainage is not so perfected as in the larger cities, without further treatment. This would considerably assist the present drainage system of towns and villages. The only objections, perhaps, that would be made to the scheme are on the manufacturers' side, who hitherto have had no expense for purification of waste, would now be subjected to extra expense. There is no doubt that the old mode of disposal is more suitable to them than any new one, which costs them nothing, rather than to fall in with a system that puts extra, though perfectly just, charges upon their shoulders. This question, however, is one that will affect the whole of the taxpayers, and as the incidence of rating is becoming more and more keenly felt, depend upon it there will arise a general demand that those who make the contamination should pay for the purification. I wish mainly to point out in my remarks the use of such process for hospitals, institutions and such places, existing in cities and towns, which endanger life from their sewage. All hospitals should have some one process of this kind in use.

For the purpose spoken of here there remains no doubt that the efficacy of a continuous current of electricity would, under most circumstances, be perfectly satisfactory can hardly be denied. And here, again, is another direction where, sooner or later, the time being near, central stations will be required to supply a demand. Gradually, but surely, ways will be opened for the machinery to be kept working at full loads, but, unfortunately, many of those engaged in the industry are so taken up of the thing that is—that is, the supply of current for light—that they ignore all other considerations. Let us hope to the gradual enlightenment of municipal engineers and public health boards, rather than to the written words uttered by us. The municipal engineer has to look forward to the demand of to-morrow as well as to that of to-day, and he is gradually becoming familiar with facts that will enable him to make provision for the future. BLEYER.

CORRESPONDENCE.

OUR BOSTON LETTER.

The Holyoke (Mass.) Street Railway Company has added to its electric system a number of Westinghouse motors.

The Highland Electric Company has been organized at Portland, Me., for the purpose of manufacturing electrical specialties.

The General Electric Company has made a contract with the Merrimac Valley Street Railway Company, Lawrence, Mass., by which the latter adds to its system 15 car equipments, including 30 motors of S. R. G. type.

Mr. George H. Sylvia, traveling salesman for the Mt. Washington Glass Company, of New Bedford, Mass., was in this city recently exhibiting to the electrical trade an entirely new line of decorated glass shades for incandescent lamps.

Mr. H. E. Swift, vice-president of the Framingham Brass Manufacturing Company, South Framingham, Mass., favored this office with a visit recently. Mr. Swift's company make supplies of various kinds for electrical manufacturers.

Removal.—The isolated incandescent lighting department of the General Electric Company, until recently located at No. 600 Atlantic avenue, this city, has been removed to larger and more commodious quarters on the first floor of the Exchange building, No. 180 Summer street.

Messrs. G. G. McDuff and N. W. Gage, of New York, the former representing Johnston's Electrical Directory, and the latter the publisher of the *Buyer's Reference*—also an electrical publication—favored this office with their genial presence, at times, during their recent short sojourn in this city.

Mr. John M. Orford, formerly general manager of the Bridgeport, Conn., Electric Light Company, has been appointed assistant general manager of the Boston Electric Light Company. President Gilbert is to be congratulated on securing as his chief aid a gentleman possessing the experience and ability of Mr. Orford.

Messrs. Gillis & Gleeson, No. 107 Sudbury street, this city, are successors to Mr. Albert L. Russell, and will continue the business established by Charles Williams, Jr., upward of a decade ago, and successfully conducted by Mr. Russell for many years past. Mr. Duncan Gillis and Thomas W. Gleeson were in the employ of Mr. Russell several years and are familiar with the manufacture of the celebrated telegraph and electrical instruments which gave Messrs. Williams and Russell such an enviable reputation throughout this country and abroad.

A New Electric Road.—On September 19 there will be rejoicing among the citizens of the town of Holbrook, Mass., to celebrate the opening of the electric street railway connecting the town named with the city of Brockton, Mass. This road is one division of the proposed electric line which eventually will connect Brockton with Boston.

The Electrical Forging Company of this city has been honored by the Franklin Institute. "The Board of City Trusts, of Philadelphia, upon the recommendation of the Franklin Institute, recently awarded to George D. Burton, of Boston, president of the Electrical Forging Company, the John Scott legacy premium and medal for his Burton system for working metals by electricity."

Proposed Electric Railway for Stoneham, Mass.—Stoneham citizens showed a deep interest in the proposed new electric railways for that town by gathering in such numbers as to nearly fill the town hall, on Saturday evening, to listen to the joint hearing given by the selectmen on the petitions of the Boston, Malden and Stoneham and the Stoneham and Boston Railway Companies, for a location of tracks, poles and wires for an electric railway. Both companies desired the same location from Central square in Stoneham down Main, South and Pond streets and Woodland road to the Medford line. Owing to "Road No. 2" having also asked, in its petition, for a location from Stoneham Center northerly to Reading, another company, the Wakefield and Stoneham Street Railway Company, was a directly interested party as a remonstrant, this company having previously petitioned for a location over the same route. The Wakefield and Stoneham Company has already nearly completed an electric line from Wakefield to Stoneham Centre and is only awaiting the decision of the Stoneham selectmen on their petition, before building its line to Reading. After an animated discussion of three hours a vote was taken and resulted in more than three-quarters of those present voting in favor of the Boston, Malden and Stoneham Road, and only one in favor of "Road No. 2." The selectmen reserved their decision. W. I. B.

Boston, September 17.

SPIRIT OF THE BRITISH TECHNICAL PRESS.

Electrolysis.

According to the *Journal* of the Electrical Society, M. A. Chassy proposes to substitute the following for the law as enunciated by Faraday, Becquene and Wiedemann: "When any substance whatever is electrolyzed there is always liberated an equivalent of hydrogen, or the corresponding quantity of the electro-positive radicle."—*The Electrical Engineer, London.*

French Submarine Telegraph Enterprise.

The French government recently acquired the telephonic network of the French General Telephone Company. The company continues, however, to apply itself to the manufacture of telegraphic apparatus and the laying of submarine telegraph cable. In the course of last year the company laid 2,750 miles of cable for the French Submarine Telegraph Company. Another important operation undertaken by the French General Telephone Company in 1891 was the laying of a cable from Marseilles to Oran, a distance of 630 miles. For the purpose of carrying out this work the directors of the company deemed it advisable to purchase the "Westmeath," a cable steamer, which will in future be known under the name of the "François Arago." The profit derived from working last year, including the balance brought forward from 1890, was £92,094. Of this sum £40,000 was devoted to the payment of a dividend of 16 shillings per share, £2,156 was carried to the statutory reserve fund, and £4,157 was carried forward to the credit of 1892.—*Engineering, London.*

Electrical Engineering in Madrid, Spain.

The administrator of the royal palace, which so far has been lighted by gas made on the premises, has been instructed to contract for an electric light installation. It is to be on a gorgeous style, and 1,800 lights are to be provided for. The different estimates that have been sent in, we are informed, range from £14,000 to about £20,000. Messrs. Siemens & Halske, of Berlin, have recently commenced the erection of an electric light and power installation at Alicante. The usual Siemens continuous current dynamos are used, driven by three "Otto" gas engines operated by Dowson gas. Many of the electric light installations in Spain which supply continual current are now running their machinery to their utmost power, and in order to keep pace with the demand upon them for electrical energy are about to order accumulators. Not only the small stations are in this state, but even the Alicante station, which is a comparatively large one, requires means for supplying additional energy, and will probably give a large order for accumulators. A new model of Tudor's type of accumulator is likely to have the preference.—*Industries, London.*

Electric Castings.

There is no end to the side applications of electricity, some of which, like "electric tanning," appear to have a certain utility, while others, like "electric sugar refining" and "electropathic belts," are nothing but rank quackery. To which category the treatment of iron and steel castings with a current during solidification belongs we shall not venture to pronounce, but certain it is that a process has been devised by which an arc is applied to a freshly poured casting to retard its solidification and to allow it an opportunity of becoming dense and homogeneous. The method can be used to add a portion of metal to the casting by making the former an electrode, and allowing it to fuse with the latter, or for keeping one part of the casting fluid while the rest is allowed to solidify. In this case a separate electrode of "coke graphite or molten slag" (!) is used. Metals which "boil" when solidifying are thus provided with a free vent for extruded gases. Silicon and, lately, aluminium have been used with success to produce sound castings, the former being particularly effective in keeping the metal quiet, and hydraulic pressure has also been resorted to. It remains to be seen whether the new plan will aid in the manufacture of steel castings, which are often apt either to be unsound or, if sound, untrue to pattern.—*Industries, London.*

The Elihu Thomson Prize.

TO THE EDITOR OF ELECTRICAL REVIEW:

At the last prize instituted by the city of Paris for the best electric meter, the prize of 5,000 francs was awarded to Prof. Elihu Thomson.

With the desire that this sum should serve for the development of the theoretical knowledge of electricity, he has requested the undersigned, general manager for Europe of the Thomson-Houston International Electric Company, to offer a prize for the best work on a theoretical question in electricity, and to organize a committee who should propose the subjects, examine the productions and decide the prize.

The following gentlemen have been chosen, and have kindly consented to act as members of the committee: J. Carpentier, president of the Société International des Electriciens; Hippolyte Fontaine; E. Hospitalier, professor in the School of Physics and Chemistry of the city of Paris; E. Mascart, member of the Institute. A. Potier, member of the Institute, examiner, B. Abdank-Abakanowicz, consulting engineer, secretary of the committee.

The committee has decided that the prize should be given for an investigation on one of the following subjects:

1. The heat developed by successive charges and discharges of condensers under different conditions of frequency, nature of dielectric and quantity of charge.

2. It has been shown theoretically that when the two surfaces of a condenser are connected by a conducting body, the condenser becomes the source of alternating currents as soon as the resistance of the conducting body decreases below a certain limit. The formula that permits calculating the period of this oscillation has not yet been completely verified. This period of oscillation should be investigated experimentally under conditions such that the exact measure of resistance, capacity and coefficients of self-induction may be possible, in order to arrive at a complete and precise verification of this formula.

3. When a condenser made with an imperfect insulating material has been charged and then left to itself, the charge is gradually dissipated. The time necessary for the charge to be reduced to a given fraction of its initial value depends only on the nature of the insulating material. It is proposed to investigate whether, as certain recent theories would seem to indicate, analogous phenomena do not present themselves in metallic conductors, and whether these can be shown experimentally.

4. It is proposed to arrange and systematize our present knowledge of the graphical solutions of electrical problems, and deduce from them some general methods as in graphical statics.

The theses presented may be written in any one of the following languages: English, French, German, Italian, Spanish or Latin. They may be in manuscript, or printed.

Each thesis presented must be signed by a pseudonym and accompanied by a sealed envelope bearing the same pseudonym on the outside, and with the name and address of the author inside.

The papers must be sent before the 15th of September, 1893, to B. Abdank-Abakanowicz, consulting engineer, the secretary of the committee, at 7 Rue du Louvre, Paris, who will furnish any further information required. ERNST THURNAUER.

Paris, September 1, 1892.

PERSONAL.

Prof. George D. Shepardson, of the department of electrical engineering, University of Minnesota, and Miss Harriet Bowker King were married on August 31 at King's Mills, Ohio. They will reside in Minneapolis.

Down in Tennessee the telephone companies have a hard time to protect their wires, which are being stolen with impunity. Small boys pull the wires down with forked sticks, while squirrel hunters make targets of the insulators. It is said that every buggy in one of the counties is patched up with telephone wires.

LETTERS FROM A LABORATORY.—XIII.

BY JULIAN A. MOSES.

When you have made a number of bulbs of different sizes, using but one handle, you should proceed to make those having two. This you will find more difficult, as there are other elements that enter into consideration in order to make a perfect bulb. In this case a perfect bulb can only be made by having the two handles perfectly centered to start with. That is, when the tube between the handles is rotated it should turn as true as if it were centered in a lathe. If this is not the case, the handles should be heated and adjusted so as to make them come exactly opposite and in the center. Use the left hand as a rest which must be kept perfectly still, and turn the handle back and forth in the right hand until the mass between the two handles is evenly and sufficiently heated. When this is accomplished, the mass must be carefully and quickly removed from the flame; while turning use the left hand as a support, and rotate the bulb while blowing. Always keep the two handles the same distance apart, for if this is not done the bulb is liable to be either elongated or flattened more than it should be. Be careful that the two handles are perfectly centered when the bulb is cold. Here again will arise a difficulty, for this cannot be done the first time, but can only be obtained by constant practice. This last exercise is the most valuable, for on this does the quality of the rest depend, and the better that this is done the better will be your work in the future.

The results of this exercise may be put to some use, for the bulbs having handles on either end will serve as pipettes or dropping tubes to remove solutions from one vessel to another. In fact there will be a very little waste glass, even the little scraps of tubing will come in handy for connections, or perhaps other uses. I have found it a good practice never to throw away any thing that has any value, keep it labeled in some box, for it is possible that some day it may turn out to be of use. Remember that dirt is but matter out of place, so if you keep your matter always in place, there will be no dirt.

There is no manipulation in the entire art of glass blowing so useful to him who wishes to be economical and proficient as the process of joining and mending tubes. Here it is that the expense will be saved. Your pieces of costly glassware will break, and it is he who can mend a tube or attach another to a vessel who will be saved the expense and trouble of purchasing another piece of apparatus.

To perform this operation, hold the two pieces of tubing to be joined in the flame, having previously stopped up the end on the extreme left with a small piece of bees'-wax. Rotate them evenly, and as soon as they are sufficiently plastic press them edge to edge, draw them out slightly, about one-quarter of an inch; blow into the tube, press them together and repeat this as often as necessary to obtain a joint that will be invisible when finished. Always smoke a joint. The glass being thicker is more liable to break here than at any other point. Even if the glass has been smoked, it is still liable to crack if the joint is not about the same thickness as the rest of the tube.

It is somewhat more difficult to make a side joint. Here a little dexterity is required to make one quickly. Suppose we wish to make a T piece to join two Bunsen burners to one pipe from the gas cock, we would proceed as follows: Select the two tubes of the proper length, and holding the longer one to the flame, allow a small and intense flame to play on a spot at the middle of the tube. This will soften the glass and permit it to be blown out. Having had the left hand end either closed with the bees'-wax or drawn off to a point and sealed with the flame, blow sharply and suddenly into the tube and the softened glass will immediately puff out into a very long and attenuated bulb, which will explode with a loud report and separate into myriads of beautiful slender and glistening strips of thin glass. There is no danger in the explosion, so there is no cause for alarm. Rub this thin glass off and a little raised edge will be seen surrounding a small hole in the side of the tube. To this tube, and at this place, must the second one be attached. Have the second tube ready to be heated and after sealing the open end of the first tube, gradually heat both tubes until the two portions in the flame are at about the same temperature. This, of course, will be determined by the color of the glass, and it is for this reason that your table should stand out of the way of the light. If you are near a strong light you will find difficulty in determining small differences in the color of the glass while heated. The same operation must now be gone through as before in making the straight joint, and your T piece will be complete.

A New Electric Launch.

A jolly party of newspaper men gathered at the Erie ferry, foot of Chambers street, on Thursday morning, September 15, in acceptance of an invitation from the officers of the Union Electric Company, of 45 Broadway, for a run up the Hudson to participate in the trial trip of the new electric launch "Vashti," which has just been turned out from the yards of Charles L. Seabury & Company, at Nyack. They were met by Prof. William Main, the electrician of the company, and Mr. Willis S. Mullin, who aided in making the run up the Hudson very enjoyable for the party.

Arriving at Nyack they were met at the depot by Mr. S. R. Bradley, Jr., loaded into a stage and driven to the club house of the Nyack Rowing Association, from whose float the start was to be made. The launch presented a very pretty appearance as she lay in the water alongside the float, and was greatly admired by the members of the party for her graceful lines and the manner in which she was fitted up. After all were comfortably seated on board, Professor Main took his place at the bow, turned on the current and the launch glided away up the river without the slightest noise or vibration. The course was laid along the Jersey shore as far as Hook Mountain, from there diagonally across the river to Sing Sing, where a brief stop was made; thence down the eastern shore for some distance and back to the starting place at Nyack. Altogether the run occupied about two hours and a half, and in that time a distance of 18 miles was covered. The entire trip was most satisfactory, not a hitch of any kind occurring, and the boat behaving in every particular as well as even those most interested in her performance could wish.

The launch is built on the lines and model of the one belonging to the "Alva." She measures 30 feet over all, has a beam of 6 feet, 6 inches, and a draught of 2 feet. The frame is of oak, with cedar planking, copper fastened, the interior being finished in quartered oak; and, considering her size, her seating capacity is remarkable, the cock pit being 22 feet in the open, allowing sufficient room for comfortably seating 26 people. She is driven by a five horse-power motor, and with only four horse-power in actual use, driving her propeller at 400 revolutions per minute, will make on an average eight miles per hour with ease. No machinery of any kind is visible to the eye of the passengers, the motor itself being located in the stern and protected by a neat covering, which can readily be lifted to display its workings, and the other electrical instruments being located in the extreme bow under the deck and directly in front of the steersman. The storage batteries are placed on a false flooring directly over the keel, and as at present arranged consist of 72 hard rubber cells resting on insulators and answering the double purpose of supplying power and ballast for the boat. The motor itself weighs 630 pounds and the cells 37½ pounds each.

When fully charged, each cell has a capacity of 345 watt hours. The propeller, which is 20 inches in diameter with a 20-inch pitch, is coupled directly to the shaft of the motor, thus developing the greatest amount of power with the least number of revolutions. The mechanism for handling the boat is extremely simple and consists principally of a combination double throw switch and rheostat located directly under the steering wheel and convenient to the hand of the steersman. This arrangement is also the invention of Prof. Main, and enables the steersman to control the entire evolutions of the boat by simply turning one wheel, which rests against a dial furnished with markers, on the front of the switch-box. By turning the wheel to the right a certain distance the contact is made and the motor started. By continuing the same motion a little further additional current is thrown in as wanted, and by reversing this motion when the boat is traveling ahead the contact is broken, then made again and the propeller reversed, with one motion of the hand. The voltmeter and amperemeter are placed one on either side of the switch box in plain sight. Commodious lockers occupy the space under the seats, which run entirely round the cock pit and afford considerable storage space, which is generally taken up with the batteries. A decided novelty in the construction of the batteries themselves is the substitution of zinc for lead in the negative pole. Professor Main claims that it gives a higher voltage with less weight and is a step toward the solution of a problem which has been confronting electricians for a long time.

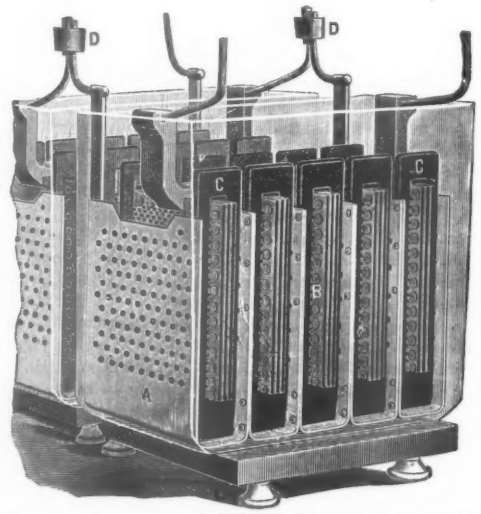
Upon the return of the party from their cruise the launch was photographed from the club house float in several different positions, and the guests were then escorted to the hotel, where a very enjoyable collation was awaiting them. After doing full justice to this important factor of the trip, they were escorted to the depot, and took leave of their entertainers with many expressions of mutual congratulation, and the hope that the "Vashti" might prove the nucleus of a numerous fleet.

ITEMS OF GENERAL INTEREST.

The new telegraph line between Bristol and New Hampton, N. H., is completed and ready for business.

The Western Union Telegraph Company is in its new quarters in *The Chronicle* building at Augusta, Ga.

W. E. Ayre, of Newbury, N. Y., has purchased land in Monterey, and will build an electric experimental station and manufactory, employing 30 men.



THE MAIN STORAGE BATTERY, A MODIFIED FORM OF WHICH IS USED ON THE ELECTRIC LAUNCH "VASHTI."

According to a Pittsfield paper, William Stanley, Jr., has suggested the removal of the Stanley electrical works from Pittsfield to Cone's new mill in Housatonic.

What is claimed to be the largest dynamo ever built in Maine is now in operation at Portland. It is for the Portland Company's new electric crane, and was built by the Belknap Motor Company.

The New York and Ohio Company, of Warren, Ohio, makers of the Packard lamps, have just added a valuable equipment of machinery to their works, and will branch out materially in the manufacture of electrical appliances.

The difficulty of making on indelible marking on ivory push buttons has been, it is said, overcome by a London concern. The process employed is called endolithic printing, and the markings are claimed to be indelible in any climate.

The Thomson-Van Depoele Electric Mining Company, of Boston, is working the field of manufacturing electric mining apparatus very successfully. The company now has on hand contracts for 11 underground locomotives. These are distributed among gold, silver, copper, iron and coal mines.

The recent offer by New York people for the treasury stock of the Westinghouse Electric Company is said to have been something above 40. The management promptly declined it and believes that when the proper time comes it can realize more than twice the amount offered for it. Present buying of the stock is excellent.

Drawings have been completed and are in the hands of the contractors for the factory of the Hopedale Electric Company, at Milford, Mass. The buildings will be 100x180 feet, two stories. There will be a transfer table 30 feet wide, running the whole width of the building, with 12 side-tracks on each side. The stock rooms will be in front of the building.

The Thomson-Houston Company has given out contracts to a Boston contractor for two new buildings to be erected on the marshes, at Lynn, near the present new ones. A large power house is to be built, which is to supply all the power for the factories on Western avenue, Center and Federal streets, to do away with the boilers and engines there, except for heating purposes.

By a special device the storage batteries invented by Captain A. de Khotinsky, of the Germania Electric Company, Boston, are rendered entirely free from any offensive fumes and though exhibited at Frankfort and Brussels, in the midst of delicate electrical apparatus, no objection was raised to their presence, so that there would not be the slightest difficulty in placing them in a cellar or an office without special means of ventilation.

The common council of Oshkosh, Wis., has carried out a scheme that has been agitated in Milwaukee off and on for several years. It is that of compelling street car companies to carry working people at reduced rates. In granting an electric railway franchise the Oshkosh Council made it a condition that between 6 and 7 o'clock A. M. and 6 and 7 o'clock P. M. the fare would be only three cents. The company is a Westinghouse concern, and pays the city a bonus of $25,000.

It is expected that Detroit people will be able to telephone as far as New York within a few months. The Long-Distance Telephone Company had its line of wires constructed up to the River Rouge three weeks ago, and has only been waiting to get its franchise through the council before beginning work. There is little doubt that Mayor Pingree will approve the ordinance as soon as possible. Agent Cole says the work of constructing the plant within the city will be begun at once and will be completed in four or five months.

The increase in the power service required by the Newton Electric Railway has caused quite an addition at the plant of the Waltham, Mass., Gas and Electric Company. A new power generator has recently been put in, making four in all, and others will soon follow. Two new upright boilers are being placed in position, each 150 horse-power, while a foundation for a third has been set. The aggregate in boiler service is 750 horse power at present. In generators the service is 320 horse-power, while the service in street and store lighting caused a constant increase in dynamos.

TELEPHONE TALK AND COMMENT.

Mr. E. J. Hall, vice-president and general manager of the Bell Telephone Company, of Buffalo, died of heart disease at his residence in Buffalo, Tuesday, September 18, 1892. Mr. Hall was 64 years of age, and had been the active head of the telephone company since 1886. His work in telephone affairs was always progressive and earnest, and he was a recognized force in this field. Mr. Hall was born in Perth Amboy, N. J., and was largely interested in terra cotta manufacture. Mr. E. J. Hall, Jr., the vice-president and general manager of the American Telephone and Telegraph Company, is a son of the deceased. The telephone fraternity has lost a conspicuous and able member in the death of Mr. Hall, and he will be mourned by a large circle of friends and acquaintances.

The New York and New Jersey Telephone Company, with commendable enterprise, laid a temporary cable from Babylon, Long Island, to Fire Island, when the quarantined passengers from the "Normannia" had been landed. The distance by water was 10 miles, and an emergency cable made up by hand, consisting of a pair of Okonite wires twisted around an iron wire and weighted down with railroad fishplates, was placed on the bottom of the bay. The whole work had to be rushed through at a lively rate, but the New York and New Jersey officials were equal to the occasion and got communication through in good time.

President Hudson, of the American Bell Telephone Company, Boston, returned last week from Europe. His steamer, the "Columbia," fortunately had a clean bill of health, and the passengers were all permitted to land after a very slight delay.

John Stone Stone, a son of the late General Stone, who was for 13 years commander of the Egyptian army, with the title of Stone Pasha, is doing some excellent work in a scientific way for the American Bell Telephone Company. Young Mr. Stone's title, as the eldest son of a Pasha, is Stone Bey, and this title is often given him by his intimate friends. In higher mathematical work Mr. Stone is recognized as quite an authority in Boston telephone circles.

Mr. C. Jay French, formerly assistant general manager of the American Bell Telephone Company, has been deservedly honored by being made general manager of this great company. For some eight years Mr. French has been actively engaged in telephone work, leaving the responsible position of superintendent of United States railway mail service to take charge of the Western interests of the Bell Company, with headquarters at Chicago. After a short period in the West, Mr. French was called to Boston, where he has resided since, and at a recent meeting of the directors of the American Bell Company was unanimously elected general manager, where his experience and abilities peculiarly fit him for successful work.

Isn't it about time for the magneto telephone exchange to be heard from? We think there is a rich field to be tilled right here.

The experiment of supplying battery power to telephone sets from the central office, thereby displacing the battery at each station, is being made with, however, only a fair degree of success. This is comparatively an unworked field, and he who succeeds will be crowned with high honors and receive the blessings of the telephone companies of the country.

The long-distance telephone line which the Sunset Company is building from Seattle, Wash., to Portland, Ore., will be completed in about two weeks. Two gangs of men are working on it, one of which has laid a cable across the Columbia River to Vancouver and is now working towards Kalama, while the other has built the line from the North and is working from Kalama to Vancouver. The line between Olympia and Tenino is being rebuilt.

TELEPHONE CHAT.

A new metallic circuit is to be established between Little Rock and Hot Springs, Ark.

Direct telephonic communication between Oakland and Woonsocket, R. I., has been asked for. Messages are now transmitted *via* Providence.

M. E. Hatch, superintendent of the Southern Massachusetts Telephone Company, has put in long-distance telephones for the Mt. Hope mills and Somerset and Johnsonbury Manufacturing Company.

The City and Suburban Telegraph Association, of Cincinnati, has constructed a long distance metallic copper line between that city and Dayton, O. It is now open for business between the points named, and will be extended to Springfield, Columbus and other points within a short time.

The citizens of South Riverside, Cal., contributed $500 toward the construction of a telephone line from that city to Riverside, which line will connect with the entire system operated by the Sunset Telephone and Telegraph Company. It is expected that the proposed line will be in operation within 60 days.

The New England Telephone Company has never paid taxes in the city of Salem, Mass., and the assessors are now contemplating a move toward assessing them in 1893. During the next few months they will confer with the assessors in other cities, with a view of establishing a rate of assessment upon instruments, poles, wires, etc.

The new telephone exchange to be installed in the Albany building, Cincinnati, will be equipped for metallic circuit service. When this is completed the telephone company will be prepared to offer its subscribers metallic circuit lines with long distance transmitters. The work of remodeling the Albany building is being pushed. Contracts have been let for underground cables, new switchboards and an entire new exchange equipment, and the telephone company expects to occupy their new building and have the new exchange operating before January 1, 1893.

Manager Clark, of Sioux City, Ia., says the talk about his company having no rights or franchise in the city is decidedly mistaken. He declares that the company has a perpetual franchise, which guarantees it equal rights with any other company, and there is a question whether its exclusive franchise has yet expired. By an agreement between the city and the company, of which the company carried out its part, the city was to have passed a resolution extending the exclusive franchise ten years, or till about the year 1900. Mr. Clark is not convinced that this agreement is yet void.

The annual meeting of the Cleveland, Ohio, Telephone Company was held last week. The business of the past year was carefully reviewed and approved. The election of officers resulted as follows: President, Levy Sprague, of Lowell, Mass.; vice-president and general manager, J. P. McKinstry, of Cleveland; secretary and treasurer, C. J. Glidden, of Lowell, Mass.; board of directors, Levy Sprague, Lowell, Mass.; J. E. Hudson, Boston; and the following from Cleveland, W. J. McKinnie, A. B. Hough, George W. Short, E P. Williams, P. Yensel, J. P. McKinstry, C. J. Glidden, Charles E. Adams and Thomas Sherwin.

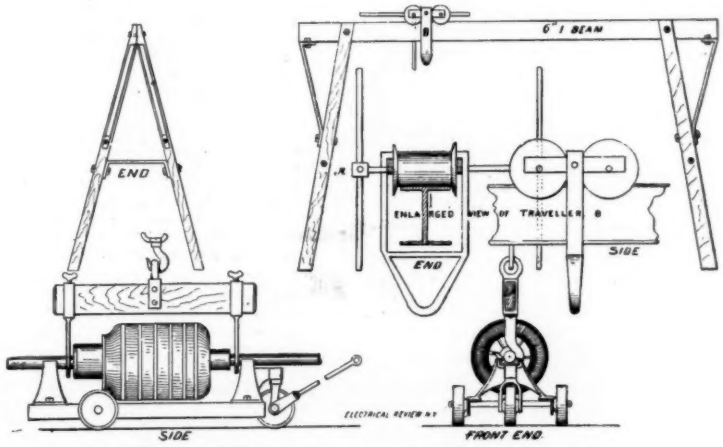
When the telephone was first shown in Portland it so happened that the promoter of the scheme for Portland, Mr. George Smardon, before he could get his work in (and he was thought then somewhat too hopeful!), was taken sick with rheumatism and had to give the business up. One day a little fellow looked in at the office, a little telegraph messenger boy, and gazed wonderingly upon the novel machine. His inquiries were so intelligent and his manner so respectful, that Mr. Smardon gladly told him all about it, and what the principles were. Shortly after the same boy appeared with two perfect machines, self-made, all but the magnet, which he purchased and improved, but lacking the wire. This Mr. Smardon gave him (about a mile of it), and, behold, our little messenger boy had a line of his own, in perfect working order, even to the bells. For years Mr. Smardon lost sight of him, but a few days ago he called and related his experience. He had earned his money, worked his way through college and is now a professor in a New England college, electricity and its opportunities in the future being one of his branches of teaching.—*Bangor, Me., Whig and Courier.*

At a meeting of the officials of the Central New York Telegraph and Telephone Company, held in the company's office at Utica a few days since, there were present General Manager C. A. Nicholson, General Superintendent W. W. Nicholson and Division Superintendents George W. Wood, of Utica; Charles N. Crain, Rome; E. V. Adams, Oneida; W. L. Burdict, Syracuse; W. D. Hanchette, Watertown, and George W. Pulser, Cooperstown. Each division superintendent was furnished with a copy of specifications showing what should constitute a standard 25 foot toll line. An inspection of these specifications shows that telephone construction in this direction has made a long step towards more perfect service. The foreman of each gang of workmen carries a copy of the specifications, which are furnished with drawings and explanations covering every possible contingency which may arise, and giving detailed instructions how to set poles, attach braces or guy wires, and run the main wires—even to how they should be attached to the insulators. In this way the foreman is not left to his own judgment, but has implicit instructions mapped out for him to cover all emergencies, and these he must follow, thus insuring the best possible construction. An interesting diagram in the specifications shows an ingenious plan of overcoming induction—that annoying feature of electricity by which what a person is saying on one wire passes through the air and is heard by and interferes with parties talking over another wire running parallel. The specifications show a plan of alternating parallel wires in such a way as to break up or prevent induction. This is one of the most important advances made in construction, especially of toll lines. The company is gradually substituting metallic circuits for grounded ones for toll line business, and when the change shall have been completed over the entire plant the service will be second to none in the United States, or even in the world. The company is also now actively engaged in constructing a metallic circuit of copper wire between Utica and Oneonta, with one pair of through wires for through business, one pair of local wires to Richfield Springs and other local circuits, which will take in the different villages along the Sauquoit Valley as far south as Waterville, Leonardsville and Unadilla Forks. The telephone long distance transmitter and receiver have reached a degree of perfection that it will be difficult to improve upon, and improvement in service must now be found in improvement in construction, and in this direction the Central New York Company is sparing no effort to reach the highest degree of perfection possible.

Devices for Handling Armatures in Power Stations.

In crowded dynamo rooms and places where the economizing of space is of the utmost consideration, the following devices, designed by Mr. James Anderson and used by him at the power house of the Brooklyn City Railroad, will prove of great benefit to those who are in just such situations:

Where loads up to about two tons in weight are to be carried from place to place and it would not be convenient to build a large carrying crane, a smaller and cheaper one may be made to answer all purposes. Such a one is shown herewith. If it is not desired to lift more than the above weight, the dimensions given will be a sufficient guide to the construction of one. The uprights may be made of hard pine, 3 inch x 5 inch x 9 feet, braced by 1⅝ inch x ⅝ inch flat iron. The "I" beam between the uprights is of 6 inch iron, 16 pounds to the foot, and about 10 foot long. Fig. 2 represents, on an enlarged scale, the traveler for carrying the load from one point to another. The rolls are of cast-iron fitted with steel spindles; the straps connecting the rolls are of ¾ inch x 2 inch iron; the suspension strap is of 1½ inch x ⅝ inch iron, rounded at the bottom, as shown, with a cross brace to prevent binding. Attached to one of the rolls, through which the axle has been extended, is a handle or a wheel, which enables the load to be more quickly moved. This crane is light, inexpensive and easily made, and will be indispensable to those in charge of small and crowded repair shops.



DEVICES FOR HANDLING ARMATURES IN POWER STATIONS.

Fig. 1 represents a very handy armature truck. The novel points in this machine are that it is adjustable to any size armature, and is easily manipulated in a crowded dynamo room. The truck, being made of iron, may be satisfactorily used as a support for the armature while in the cooking oven. This style of truck is found to be much better than the rope method, for when once set to balance the armature, there is no trouble whatever in handling it, and by this means all danger from contact with wiring is completely avoided.

The President's letter of acceptance, which was this year given to the press at a quarter of six on Labor Day, where there was unusual pressure of cholera, political and sporting news, fully tested the remarkable capacity of modern press wires in its speedy handling. Such matter is rushed to the newspapers with the utmost promptness. In the Washington office of the Associated Press it was placed on two wires a little before six and transmitted to Baltimore, Philadelphia and New York, by W. S. Daniels and E. J. Cox, in one hour and 50 minutes. Complete copies of the letter, typewritten from the wires by the receiving operators, were thus placed in the hands of the printers in those cities before eight o'clock. Simultaneously was sent over the same wires a column of synopsis of the letter for transmission from New York by cable, making a total of over 11,000 words sent on two wires between six and eight o'clock, or at an average speed of 45 words a minute for two consecutive hours.

LITERARY.

"The Practical Management of Dynamos and Motors," by Francis B. Crocker and Schuyler S. Wheeler, D. Sc. Illustrated. Price, one dollar. Sent prepaid on receipt of price by the ELECTRICAL REVIEW, 13 Park Row, New York. This work is meant to be a hand-book for ready reference. It contains terse and simple directions for the practical use and management of dynamos and motors. The authors are able, practical men who have made names for themselves in both the commercial and theoretical development of electrical apparatus. It is one of the most valuable books a practical man could possess.

H. C. Bunner, the editor of *Puck*, who has been recently in Chicago to write the article on "The Making of the White City" for the World's Fair group in *Scribner's Magazine*, says that what was in June, 1891, a waste plain of sand has now become the "scene of one of the most marvellous manifestations of mechanical achievement which the world has to offer. He who goes to that lake-side desert a year from now will see rising from a gracious and well ordered garden a white city of glass and iron, a settlement of structures gigantic in plan and skill beyond anything that science has hitherto held feasible or desirable for the sheltering of a multitude of pleasure seekers." W. T. Smedley accompanied Mr. Bunner, and made a series of remarkable sketches of the work in progress (which will appear with the article in the October number).

There is every indication that *Godey's Magazine* for October, already on sale, will mark an era in periodical literature. This will no longer be known as *Godey's Lady's Book*, but, *Godey's, America's First Magazine*, Established 1830. In the first place, the magnificent work of art "Godey's Idea of the 'World's Fair,'" which is to be presented to every purchaser of this number, is said to be so beautiful and artistic in design and coloring that every one will want it. It is a faithful reproduction of one of W. Granville Smith's latest and greatest pictures, produced expressly for Godey's. The publishers guarantee that the magazine itself will be filled with surprises and beauties from cover to cover. First in the contents comes John Habberton's complete novel, "Honey and Gall," a companion to "Helen's Babies," fully illustrated by Albert B. Wenzell. This is an idea first conceived by *Godey's* and now produced with brilliant success. *Godey's* fashions will be a most conspicuous and beautiful feature of the publication, there being, in addition to carefully edited descriptions and fashion articles, four exquisite plates produced in 10 colors, and representing four of the leaders of New York society, attired in the latest Paris costumes. Mrs. Henry Ward Beecher's "Home" department will be read by the women of America with delight, and all the magazine's old admirers will read with interest Albert H. Hardy's carefully written article on "Godey's, Past and Present." Among the choice verses is the latest poem written by the late Josephine Pollard. John Habberton reviews all the books, and the whole forms such a rich literary feast that to examine a number of the new *Godey's* will mean to irresistibly desire it.

The *Review of Reviews* for September is so edited as to remind its readers that there are, even in a presidential year, many other topics besides politics that claim a share in the general attention. In its timeliness, freshness and originality, this September issue of the *Review* is fully equal to any of its predecessors. It is a remarkably general testimony on the part of the readers of this enterprising periodical that every succeeding number is a fresh surprise and a welcome one. The September number has for its frontispiece a spirited full-length portrait of the great French scientist, Camille Flammarion, standing by the side of his telescope in the observatory at Juvisy; and the "Progress of the World"—that is, the editorial opening department of the *Review*—begins with a discussion of Mars and its inhabitancy, illustrated with Chiaparelli's map of the surface of Mars, and portraits of Professor Holden, of the Lick Observatory, and Francis Galton, chairman of the Royal Observatory at Kew, England. Flammarion is not only a great astronomical authority, who makes bold predictions as to our future intercourse with the inhabitants of Mars, but he is also one of the leaders in the psychical research movement and the general study of the phenomena of mind that occupies so prominent a place in the investigations of our day. The department of "Leading Articles of the Month" in this number of the *Review of Reviews*, devotes a large amount of attention to psychical research, and contains magnificent portraits of Prof. Charles Richet, the distinguished French scientist; Prof. William James, of Harvard; Prof. Henry Sedgwick, of Cambridge, England; Mr. Alfred R. Wallace, Dr. Richard Hodgson and Mr. F. W. H. Mersy.

"The Deadly Horse Car."

ONE HUNDRED AND EIGHTY-SIX PEOPLE INJURED WITHIN ONE WEEK IN THIS CITY.

[From the New York *Recorder*.]

Few of the citizens of New York who are compelled to travel on the horse cars are aware that their lives are constantly being menaced by the horses that are now used to draw the cars. Not only are people who ride in the horse cars in constant danger of meeting with an accident, but every one who crosses the streets through which the horse railways pass. The large number of accidents that are constantly occurring is something appalling, and a careful examination of the records shows that New York has the most dangerous street car service in the world—worse ten-fold than the much abused trolley.

New York is sadly in need of better rapid transit, and this can only be accomplished by the street cars being drawn by some safe motor. The life of every citizen, no matter how humble, is more valuable than all the franchises which these companies own. For the purpose of exposing the danger of the use of horses by the street car companies, and ascertaining, as far as possible, how many accidents have occurred on the different street railways in New York city during the past few months, the writer examined the records left at the hospitals and by the police. Upon inquiry and examination it was discovered that these records are not complete, and hardly more than 10 per cent. of the accidents daily occurring on the street cars are ever reported. If a complete record could be kept, the result would be startling, and a quick demand would be made by the people of this city to abolish the horse car system.

The managers of the street railway companies acknowledge that the horses are very dangerous; that they are compelled to pay annually thousands of dollars in damages to people who have been injured by the horses, and they claim that they would gladly change to another system of running their cars, but that they find themselves blocked by the city authorities and popular prejudice in the introduction of any new ideas; and, therefore, they are forced to keep on with the horses.

For months efforts have been made by several street railway companies to secure the franchise to use the trolley system. Every obstacle has been thrown in the way to prevent the granting of the franchise. Absurd objections have been made, and it has been claimed that the trolley would be a constant menace to life. This statement is false, and the lives of people would not be threatened one-half as much as they are now by the street car horses. This has been demonstrated by the reports from the authorities of the cities where the trolley is now in use.

In securing the reports of the accidents on the street cars made to the police, only the most serious cases were made a note of. There were several men and women knocked down and instantly killed, and those who were injured are permanently disfigured for life. Few of these accidents occurred through the negligence of the people who were injured. At times it is impossible to control the street car horses, and any one who is near at the time is liable to be injured.

Many of the accidents that have happened through people being injured by the horses of the street railways have not been reported at the hospitals. This is owing to the fact that these accidents were of such a slight nature that the people who were injured were treated at their own homes by their own physicians.

The reports made to police headquarters from the different police precincts show that during the week ending September 10 there were 186 people injured by street car horses. Many of these injuries were of a trivial nature, but for all that the large number shows that the use of horses by the street railway companies is very dangerous. The reports of scalp wounds, sprained ankles, cut legs, broken arms, cut faces, etc., are not taken into account.

An official at police headquarters who has had charge of the accident book for a number of years in an interview stated:

"About 60 per cent. of the reports of slight accidents which I have received from the different precincts for the past five years are caused through the negligence of the employés of the street car companies and through the use of horses. If the companies were compelled to do away with the use of horses the accidents would not occur. It is my opinion that more people are injured by the street car horses in New York city daily than in any country in the world. I am in favor of doing away with the horses immediately."

At the Chambers Street Hospital a large number of accident cases are treated daily by the surgeons in charge of the dispensary, and from the account given by these physicians it is made evident that most of the wounded people who apply to them to be treated receive their injuries through being knocked down or hit by the street car horses. The writer visited the dispensary of the Chambers Street Hospital, and out of 30 cases that were being treated 28 of the persons received injuries from the street car horses.

An ambulance surgeon attached to the Chambers Street Hospital stated that one day he had six calls, and out of the six four were for people injured by the street cars.

At the New York Hospital the report of the dispensary cases for the last month showed that 126 people were treated for scalp wounds, cut necks, cut knees and sprains of the limbs, and that 60 per cent. of the injuries were received from the street car horses.

At Roosevelt Hospital several deaths have occurred within the last three months of people who were run over or knocked down by the street cars. The dispensary cases treated at this hospital were not quite so numerous as at the New York and the Chambers Street Hospitals, but they were large enough to show that the system of using street car horses was dangerous.

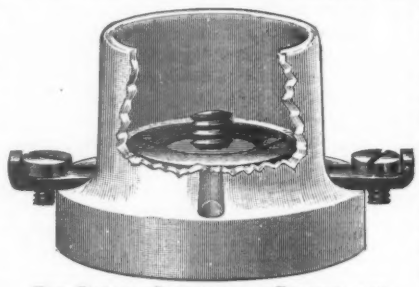
An official who is attached to Bellevue Hospital, and who has charge of the treatment of accident cases, stated that during the last three months at least 40 per cent. of the cases that had come to Bellevue from receiving hospitals were persons who had been injured by street car horses. "I have been here for the last 15 years," this gentleman stated, "and I have seen all classes of accident cases brought in from reception hospitals, and it has been my experience that where people were injured through being knocked down by street car horses it was not through their own carelessness, but either through the horses being unmanageable or carelessness of the drivers."

At a meeting of one of the local assemblies of the drivers of the street railway companies a number of men were interviewed in regard to the accidents happening upon their lines during the last two weeks. A driver of the Broadway surface railway in conversation stated:

"I know from reports made by the drivers that daily there occur upward of 30 or 40 accidents on our road alone. Very few of these are noticed by the police or are reported at the hospitals. Now, to-day, for instance, I made a trip at 11 o'clock up Broadway, and during that trip the horses ran into four wagons, knocked one man on the shoulder and got tangled up with the horses of one of the crosstown lines in a block near Bleecker street. Besides that, on the trip down town, when starting from Twenty-third street, the car was badly crowded and a number of people were standing, the horses gave a jerk and two ladies were knocked down inside the car, and one of them sprained her wrist. It is only once in a while that these slight accidents are reported, and then the reports are only made when the conductors and drivers think that there is some spotter upon the road who will report them and they will be called up for it. It is impossible to prevent such accidents so long as horses are used. Now, I am a careful driver, and I endeavor in every way to keep out of trouble, but still at the same time I cannot do it. The horses are liable to become frightened at any time, or slip and fall on a muddy day and then anybody who is near or in front of them is liable to be knocked down and injured, if not killed."

The Bryant Combination Rosette and Receptacle.

The Bryant Electric Company, of Bridgeport, Conn., manufacturers of the well known Bryant devices, have just brought out a new article which should fill a place of its own. This new device is a combination rosette and receptacle, and is shown in the illustration on this page. It is designed



THE BRYANT COMBINATION ROSETTE AND RECEPTACLE.

for theatres, temporary lighting, and many places where quick work is required. Such a device, that does not require the cutting or bending of the main wires, has been found desirable. This article seems to meet the requirements and, being moisture-proof, is especially fitted for mill and out door work.

ELECTRIC LIGHT FLASHES.

The Thomson-Houston Electric Company has been awarded a contract to put in an electric light plant at St. Johnland, the Kings County, N. Y., farm, for the sum of $97,350.

The new Omaha Thomson-Houston Electric Light Company has commenced setting the poles and stringing the wires for its incandescent system in the suburban districts of the city. The poles have been put on North Twentieth, Corby and Sixteenth streets in order to make the territory bounded by those streets one lighting district.

The Schuyler Electric Company has just received an order from the government for the largest and most powerful search-light in the world. The light is destined for the statue of Liberty in New York harbor and will be visible for 100 miles and capable of transmitting messages that distance. It will be 50,000 candle-power and will cost about $4,000.

The large water wheels for the new electric light plant at Cahee's mill at Brandon, Vt., have arrived, and work putting the same in is actively going on. The dam has been newly planked and raised, and other improvements are being made. The machinery for the incandescent lights has also arrived, and it will be only a short time before it will be in position and the lights running.

The Terre Haute, Ind., Electric Light Company has received its new alternating dynamo for residence lighting and the 50 arc dynamo for street lighting. The alternating dynamo has a capacity of 1,000 lights. After setting these dynamos the arc lights heretofore ordered can be supplied as, with its increased power, the company will be able to supply any reasonable demands for street lighting.

A Three and One-Half Mile Okonite Cable.

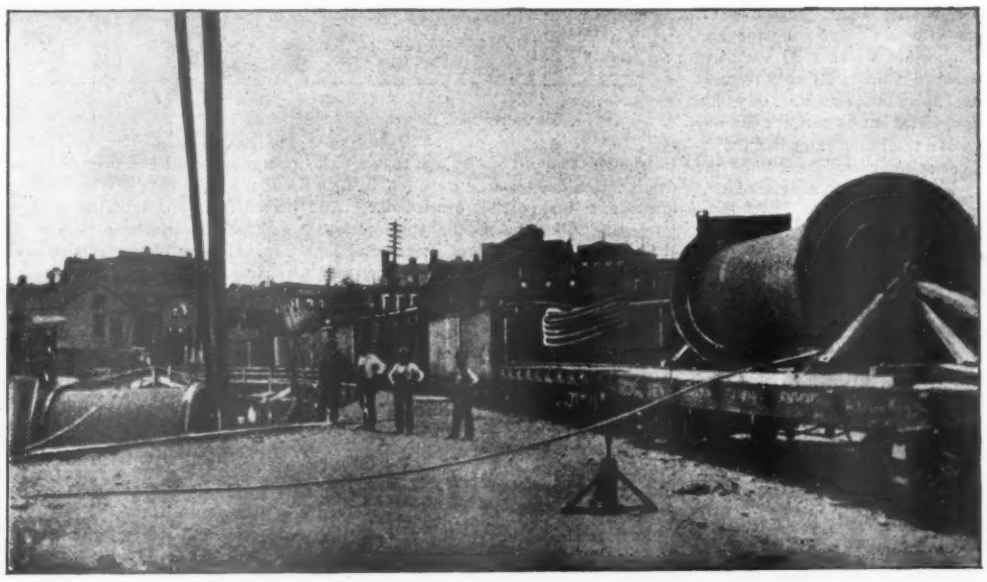
The submarine cables manufactured by the International Okonite Company, Limited, 13 Park Row, New York, and so extensively used in the exacting applications of the leading telephone and telegraph corporations in the United States, are recognized as possessing exceptional merit for pliability, durability and the very highest efficiency.

These results, so satisfactory to both the manufacturer and the purchaser, are due in part to the excellent insulating properties of Okonite, and in part to the extreme care exercised in the selection of all material, together with the close attention given during every stage of the manufacture of an Okonite cable, from the time it enters the factory at Passaic, N. J., as raw material, to the time it is shipped to its final destination as a finished production.

To a person unfamiliar with the magnitude of the business the complex specifications for a submarine armored cable are altogether bewildering, but not in a single instance has the Okonite cable failed to "test out" to the severest exactions, and it is to-day without a superior for work of this class.

The Southern New England Telephone and Telegraph Company recently accomplished the laying of an Okonite submarine cable from a point on Pine Island, near New London, Conn., across Long Island Sound to Fisher's Island. This cable was three and one-half miles long, contained six copper conductors, weighed 50,000 pounds and was in one length, without splice. It was transported from the factory at Passaic, N. J., on a "flat" car, on which was constructed a special reel and laid from point to point without delay, accident or call for special help.

The entire management of transferring from the car, laying, etc., from start to finish, was under the direction of Mr. E. B. Baker, superintendent of the Southern New England Telephone and Telegraph Company, ably assisted by Mr. R. D. Blish, the expert of the telephone company.



AN OKONITE CABLE THREE AND ONE-HALF MILES LONG.

Our illustration, taken from a photograph, shows the cable after it arrived at New London, as it is being transferred from the reel on the flat car to the reel on the float from which it was laid.

The Southern New England Company, we are informed, have also laid a new length of cable between Pine Island and Eastern Point (on the mainland), thus insuring to the public a continuation of the prompt and reliable telephone service which they so zealously maintain.

The long distance telephone line between New York and Chicago is completed as far as Cuyahoga Falls, Ohio.

ADVANCE INFORMATION.

New Electric Companies Formed and Important Constructions Projected.

VALUABLE INFORMATION FOR MANUFACTURERS AND DEALERS.

We publish below the earliest information obtainable relating to new electric railways, new electric light companies and projected electric construction of all kinds. Every reader will find these columns of special interest, and manufacturers and supply houses will receive many valuable suggestions looking to new business by carefully watching this department in the ELECTRICAL REVIEW from week to week:

New Electric Railways.

DUBUQUE, IOWA.—James Rowan is an applicant for a franchise to build a belt electric railway through several streets of this city.

NEW ROCHELLE, N. Y.—The village trustees have granted the Westchester Electric Railway Company a franchise to build from Pelham to Neptune street.

CHICAGO, ILL.—The West and South Towns Street Railway Company, E. L. Bonney, president, has contracted with the Chicago Railway Construction Company to build a double track electric line four miles in length.

BROOKLYN, N. Y.—The Broadway Ferry and Metropolitan Avenue Railroad Company (a re-organization of the Brooklyn, Bushwick and Queens County Railroad) has been incorporated, with a capital of $100,000, by Charles MacVeagh, of Morristown, N. J.; J. Ludlow, John H. Emmanuel and E. P. Bromley, of Brooklyn, and Charles H. Pond, of New York city.

HAMILTON, ONT.—A company has been formed with a capital of $3,000,000, to construct some 200 miles of electric railway in distances of 25 to 60 miles, and to supply light, heat and power to the towns and cities along each line. This will probably be the first attempt to use power from Niagara on a large scale and at long distances. It is intended to make Hamilton the center of the system and bring the power here at a very high voltage, possibly 25,000.

ROCKVILLE, IND.—The proposed new electric road between Georgetown and the Great Falls will be built. All the stock is reputed as having been taken.

PITTSTON, PA.—The Lackawanna and Old Forge Street Railway Company has been chartered to build a six-mile electric street railway from Pittston to Hyde Park, a suburb of Scranton. Directors, John Graham, G. R. Bedford, C. J. Swan, Wilkesbarre; W. G. Eno, Plymouth, and L. E. Hoover, Newville.

FORT WAYNE, IND.—The Lakeside Street Railroad Company; capital, $50,000. R. T. McDonald, the Fort Wayne electric magnate, owns to $49,800 of the $50,000 capital.

HAZLETON, PA.—The directors of the Hazleton and Suburban Street Railway Company have decided to build the line, which will be 20 miles long.

EUREKA, CAL.—There is a project having excellent prospects of success to build an electric railway from Eureka to Arcata.

SAN FRANCISCO, CAL.—Professor Lowe, who is building an electric road to the top of Mt. Wilson, proposes to construct one from Wawona into the Yosemite Valley as soon as he shall have completed the first one.

TIFFIN, O.—The Tiffin Electric Street Railway Company is an applicant to the common council for a franchise, and desires to buy the Tiffin Street Railway for the purpose of making it a trolley line.

GUTHRIE, OKLA.—A company has been organized in Elreno to build an electric railway running to all parts of the city and five miles out to the fort and Indian agency.

ST. LOUIS, MO.—C. C. Rainwater, president of the terminal company, has plans for an electric road to connect North St. Louis and St. Louis.

NEWARK, N. J.—The New Jersey Traction Company and the Newark and South Orange Passenger Railroad Company are both applicants for franchises to operate their lines by electricity.

HOMESTEAD, PA.—The Homestead and Highland Street Railroad Company; capital, $30,000. Directors, Jacob Trautman, Louis Rott and others.

GLYNDON, MD.—The Western Maryland Land Improvement Company is reported as about to build an electrical railroad.

TORONTO, CAN.—The Toronto and Scarboro Railway, Light and Power Company has been granted a franchise to construct an electric line from the city limits to Scarboro. A. W. Dingman is general manager, and he will see that work is started in the spring.

POTTSVILLE, PA.—The Pottsville, Cresson, Schuylkill Haven and Orwigsburg Electric Railway Company; capital, $75,000. John T. Shoener, of Orwigsburg, is president.

HARTFORD, CONN.—The Hartford and Wethersfield Horse Railroad Company has petitioned for privilege to try a system of electrical railway, in which the power is conveyed underground.

DETROIT, MICH.—Geo. H. Russel and Wm. Livingston, Jr., has agreed to build, equip and operate the Detroit and North Detroit Electric Street Railroad, provided the property owners agree to raise by subscription a bonus of $20,000.

BARRIE, CAN.—There is a revival of the project to build an electric railway from Allandale to Barrie.

Telephone and Telegraph Companies.

MINNEAPOLIS, MINN.—Articles of incorporation for the Commercial Telephone and Electric Company have been filed by Edward S. Corser, Thos. Lowry, Henry F. Brown, Wm. S. King, A. M. Robertson and others; the capital is $1,000,000. The company will ask the city for a franchise to conduct a general telephone and telegraph business, the generation, storage and transmission of electricity for heating, lighting and other purposes. The Dorset system of conduits will be used, the wires will be strung under a new system and messages will be transmitted by means of new electrical appliances, so that one wire will do the work of ten.

CASTLE, MONT.—The Musselshell Telephone Company has been organized with a capital of $5,000 to operate a telephone line between Oka and Castle. Geo. R. Monroe, Chas. B. Carr and Chas. E. Severance are the incorporators.

Electric Light and Power.

HAMBURG, PA.—This town has, by a vote of 313 to 114, voted to have electric lights.

ORCHARD PARK, N. Y. — The Hamburg Water and Electric Light Company will establish an electric plant at Orchard Park.

BRANTFORD, ONT.—Letters for incorporation as a stock company, with a capital of $150,000, are being applied for by a number of the leading capitalists of Brantford, with the object of improving the Grand River Canal level, and by water power furnishing electricity for public and private lighting.

DETROIT, MICH.—The Harris Electrical Propulsion Company; capital, $1,000,000. F. Palmer, chairman; J. B. Peterson, secretary; M. W. Law, treasurer.

CHICAGO, ILL.—The Electric Power Company, of Wilmington; capital, $1,000,000. Incorporators, Charles B. Holmes, Joseph E. Truitt and James Anthony. The Unity Electric Light and Power Company; capital, $50,000. Incorporators, E. H. Thompson, M P. Alford and F. S. Donnell.

SYRACUSE, N. Y.—The Electric Light and Power Company, of Syracuse, has been formed with a capital of $800,000. E. I. Garfield, president; Paul T. Brady, vice-president; M. C. Palmer, secretary and treasurer; these gentlemen, with Robert E. Drake and W. H. Girvin, constitute the directors. The new company purchased the former Syracuse electric light and power company, and will build a new station, add 400 arc lights, 15,000 incandescents and also supply power.

MADISON, WIS.—The Capital City Electric Light Company; capital, $40,000. Promoters, H. Schulkamp, C. J. Hammann, J. Schulkamp.

MAROA, ILL.—Maroa Electric Light Company; capital, $12,000. Promoters, J. Crochu, Geo. Conover, Wm. Schenck.

MILES CITY, MONT.—The Water and Electric Light Company; capital, $50,000. Promoters, E. R. Gilman, Chicago, Ill.; Birthold Ullman, W. F. Schmalsh, H. F. Batchelor and Wm. Courtenay, all of Miles City, Mont.

A DIFFERENT CURRENT.

"Well, I've heard of red currants, black currants and white currants, but I'll stop chewin' if ever I heerd of alternating currents."—*New York Truth.*

EAST ST. LOUIS, ILL. — Bradbury-Stone Storage Battery Company (Western); capital, $500,000. Promoters, S. M. Stevens, Thos. B. Crew, Frank P. Hager.

ELKHART, IND.—Articles of incorporation have been filed with Recorder Davenport for the Home Electric Light and Power Company, of Elkhart, organized with a capital of $10,000. The object is to purchase, equip and maintain electric light, heat and power plants, acquire right of way through towns and cities, and to sell same to the public and to contract with towns and cities for lighting streets. The incorporators and managers are Geo. W. Spohn, J. E. Micks, Wm. Hornberger and Etna Kuhlman.

ALLEGAN, MICH.—Allegan Electric Light and Power Company; capital, $40,000. Promoters, T. R. Harrison, George W. Tyler, M. D. Buskirk. Incorporation papers sent to T. R. Harrison, Paw Paw, Mich.

PHILADELPHIA, PA.—The Fox Chase Electric Light, Heat and Power Company; capital, $25,000. Promoters, Joseph W. Crawford, R. T. Martin, H. B. Rowland.

BRADDOCK, PA.—People's Electric Company, of Braddock; capital, $3,500. Promoters, A. T. Reid, J. K. Mills, E. J. Smail.

BROWNSVILLE, PA.—Dunlap Electric Company; capital, $5,000. Promoters, George W. Lenhart, S. S. Graham, Charles L. Snowden.

REDWOOD FALLS, MINN.—The Redwood Falls Electric Light Company has been formed with $12,000 capital. Citizens are taking stock rapidly. They are expected to raise from $5,000 to $8,000, and will control the plant until the city is able to purchase it. The plant will be running before winter.

New Manufacturing Companies.

CAMDEN, N. J.—The Oil, Fuel, Heat and Power Company, to manufacture the hydro-carbon patent burner; capital, $100,000. The incorporators are, H. B. Apple, J. V. Lafferty and Wm. Field, of Philadelphia; J. B. Apple, of Ardmore, and H. C. Haines, of Camden.

RED BANK, N. J.—The Gillett Manufacturing Company, to manufacture electrical appliances; capital, $250,000. C. F. Gillett and Joseph F. Bray are the principal stockholders.

DENNISON, OHIO. — The United Electric Company; capital, $100,000.

COOPERSTOWN, N. Y.—The Cooperstown Electric Company; capital, $12,500. Directors, Oliver R. Butler, Cooperstown; Robert E. Drake, Syracuse; and Chas. B. Staats, of Albany.

ELGIN, ILL.—The Crown Electrical Manufacturing Company; capital, $20,000. Incorporators, Frederick J. Mosedale, James B. Horne and Wm. S. Edwards.

Consolidation.

WARSAW, N. Y.—The Citizens' Gas Light Company and the Warsaw Electric Light and Power Company have combined and will form a new company with a capital of $50,000.

Increase of Capital Stock.

ANSONIA, CONN.—The Electrical Supply Company, of Ansonia, has increased its capital from $48,000 to $250,000.

Salamander Wire Insulation.

At the successful test of the above named insulation material, given at New York before several wire manufacturers and prominent electrical experts, Capt. B. S. Flanders, of Boston, was unable to be present.

The Washburn & Moen Manufacturing Company, of Worcester, who are introducing the new wire insulation on the market, concluded—with their customary courtesy—to have another public test of the "Salamander" insulation for the special benefit of Captain Flanders. On Friday afternoon, September 16, quite a number of the electrical fraternity met at the laboratory of the Massachusetts Electrical Engineering Company, corner Fort Hill Square and Oliver street, and there witnessed a satisfactory test of the Salamander insulation. In the test, a series of wires—including the popular kinds of insulation now in use—were joined together and firmly fastened to a board.

The Salamander was connected up with the other insulated wires and then a strong current of 140 amperes was applied. The circuit of wires thus formed was turned to a white heat and the various insulations, with the exception of the Salamander, were burned to a crisp. The Salamander was unimpaired by the heat, the inside rubber covering not even showing deterioration. Experts on electric wiring who were present pronounce the new insulation as being thoroughly reliable, and say that it will be a boon to underwriters of electrical risks.

The Massachusetts Electrical Engineering Company conducted the test, while Messrs. Snedeker and Cofren, of the Washburn & Moen Company, catered to the comfort of those present.

Electric Launches.

Electric launches have now become popular to a certain extent in this country, and in the United States an increasing interest in this class of boat has recently been manifested by the construction of two or three such vessels. On the European continent very little, with the exception of tests on the Lake of Geneva and short runs on the Rhine at the Frankfort Electric Exhibition last year, has been done in this direction. Now, however, an attempt is being made to introduce this type of boat in France, where, it may be mentioned, an electric launch was first seen in September, 1886, when the "Volta" made the double journey between Dover and Calais. The endeavor in question is being put forth to render the use of this class popular on the Seine, and on the 9th ult. a trial trip on that river took place with the "Eclair" between Asnieres and Epinay. This vessel was described in detail in our "Notes" columns. The trial of the "Eclair" was successful, and, from negotiations which are being carried on, it is expected that other electric launches will be introduced in Paris.—*The Electrical Review, London.*

KINDRED INTERESTS

The Electric Engineering and Supply Company, Syracuse, N. Y., is mailing to its friends and customers a new illustrated catalogue with an illuminated cover. Everything needed for electric light and railway systems of any type is included in this catalogue.

The International Okonite Company, 13 Park Row, New York, has sent us one of their electric wire computers for determining the size of wires to be used in electrical construction. This valuable device was illustrated and described recently in the ELECTRICAL REVIEW. Its price is $2.50.

The Brown & Sharpe Manufacturing Company, Providence, R. I., have sent us a copy of the new 1892 edition of their valuable catalogue. It is well illustrated, of a convenient size for the pocket and contains 248 pages. A large number of machines developed during the past year are illustrated and described.

The New York Insulated Wire Company, 13 to 17 Cortlandt street, New York, is sending out a handsomely colored lithograph showing a bird's eye view of the World's Fair buildings and grounds as they will appear in 1893. The picture carries the announcement that the "Grimshaw" white core wires will carry the current for all the incandescent lights used in the buildings and grounds of the World's Fair. It is a beautiful picture advertising a handsome contract.

The Bishop Gutta Percha Company, 420 to 426 East Twenty-fifth street, New York, have sent out a new catalogue and price list describing their well known highly insulated wires and flexible cables. A partial list of special work done by this company is mentioned in the catalogue and includes the following: First cable across North river, composed of No. 9 iron wire; cable laid across Harlem river in 1854, samples recently taken up in good order; cables used by the Lay Torpedo Company; cables for Edison-Sims torpedo boats; first cables for lighting buoys by electricity; first cables used in New York conduits for electric lighting; wires used in blowing up Hell Gate in 1876 and also in 1885.

H. Ward Leonard & Company, Electrical Exchange Building, New York city.—After a very severe contest, the bulk electric contract for the Betz office building in Philadelphia has been awarded to H. Ward Leonard & Company. In this handsome office building there will be between 3,000 and 4,000 lamps, and the plant will be a most modern one in every respect. Dr. W. A. Drysdale is the consulting electrical engineer for the work, and Mr. Alfred Wolff, of New York city, the consulting engineer on the steam work. The plant is to have slow motion dynamos directly coupled on the shaft of the engine. The plant, when completed, will be one of the handsomest in the United States.

The Enterprise Electric Company, 313 to 315 Dearborn street, Chicago, write, under date of September 13, as follows:

"Mr. W. C. McKinlock, president and treasurer of the company, has just returned from New York and the East and also spent a short time in Bristol, R. I., on a business tour to the National India Rubber Company's factory, for which company the Enterprise Electric Company has recently been appointed general Western agent. Mr. W. F. Richardson, manager, leaves for St. Louis this evening to look after the business of the company at that place, through the new branch house lately established there, at 15 North Ninth street. The fall rush is fairly on, and we have reason to be encouraged thereby. The N. I. R. wire is popularizing itself daily by reason of its seamless qualities and being manufactured of the purest and best of materials. Electrical outlook very flattering."

WANTED.

A thoroughly practical electrician, one preferred who has sufficient knowledge of civil engineering to construct water dam for power for a combination of small electric plants. A splendid opening for a competent and energetic man. Opportunity for advancement through merit. Location pleasant and healthy. Only such applications considered as are accompanied with references and full particulars of experience.

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Care of Electrical Review, New York.

A GOOD INVESTMENT.

$50,000 WANTED
TO START AN
Incandescent Lamp Manufactory
IN CANADA.

Incandescent Lamps to be manufactured by the new process of creating vacuum by METALLIC VACUUM PUMPS.

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ELECTRICAL MEASUREMENT
Instruments and Batteries of the Very Highest Grade.
Precision and Constancy, Quality and Finish the Best in the World.
Catalogue of Standard Test Instruments furnished upon application.
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5 AND 7 DEY ST., NEW YORK.

Hubbell Steel & Wire Co. St. Louis, Mo.
Artistic Metal Workers
Brass, Iron and Wire Office-work.
Railings, Crestings, Nettings, etc.
Everlasting Cemetery FENCES.
Shipped everywhere. Agents wanted.
Write for Catalogue and Estimate.

IF YOU have anything pertaining to electric machinery you want to sell, send us the description.
IF YOU want anything pertaining to electric machinery, send us your inquiries.
FRANK RIDLON & CO.,
Dealers in New and Second-Hand
Electric Light & Power Machinery,
196 SUMMER STREET, BOSTON.

THE DANDY BELL.
Best Bell, pressed metal gong, long phosphor bronze springs and platinum contact points. Most reliable bell in the market. In four sizes, 2½ inches, 3 inches, 3½ inches and 4 inches. Samples sent post-paid to all dealers upon receipt of 50 cents and business card.

THE TIME ELECTRIC CO.,
C. O. BARTLETT, Gen. Manager,
CLEVELAND, O.

CHANDLER, FFRENCH & CO.,
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KANSAS CITY, KANSAS.

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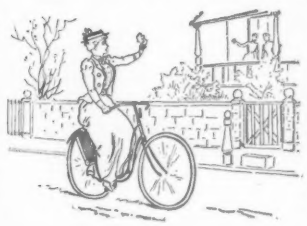
Buy and sell Electric Light and Street Railway Bonds.
Promote and contract for the construction of Electric Light Plants and Street Railways.
Correspondence solicited.



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Identical in Cost and Efficiency with Edison System.
SIMPLER TO OPERATE.
Copper required guaranteed to be not over 30 per cent. of that required for 2-wire system, under same conditions.
Royalty, 1 cent per pound of copper installed.
Patented June 7, 1892. No. 476,544.

CHARLESTOWN, W. Va., June 18, 189
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The operation of the plant is quite simple and economical and as a result the plant is making very satisfactory earnings, although our town is rather small, having only about 3,000 inhabitants.
Yours very truly,
(Signed) CITY ELECTRIC LIGHT CO.,
WM. CAMPBELL, Secretary.

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MACHINERY IN STOCK.
Engine Lathes, 10 in. x 4 ft.; 11 in. x 5 ft.; 12 in. x 6 ft.; 14 in. x 6 ft.; 16 in. x 6 ft.; 18 in. x 8 ft.; 20 in. x 8 ft., with tapes attachment; 22 in. x 12 ft. and 14 ft.; 24 in. and 26 in. x 16 ft.; 30 in. x 10 ft. and 18 ft.; 36 in. and 38 in. x 20 ft.; 42 in. x 12 ft.; 27 in. x 32 ft.; 28 in. x 31 ft.; 96 in. x 20 ft. Fox Lathes, 13 in. x 5 ft.; 14 in. x 5 ft.; 15 in. x 6 ft.; 18 in. x 6 ft. Turret Lathes, 14 in. x 5 ft.; 14 in. x 5 ft.; 15 in. and 16 in. x 6 ft.; 18 in. x 6 ft.; 36 in. x 8 ft.
Planers, 16 in. x 16 in. x 5 ft.; 20 in. x 20 in. x 4 ft.; 24 in. x 24 in. x 6 ft.; 30 in. x 30 in. x 6 ft.; 36 in. x 36 in. x 10 ft.; 42 in. x 42 in. x 12 ft.; 44 in. x 48 in. x 22 ft.; 60 in. x 49 in. x 24 ft.
Friction Shapers, 15 in., 16 in., 20 in., 22 in., 28 in.
Crank Shapers, 6 in., 8 in., 10 in., 12 in., 13 in., 16 in., 17 in., 20 in., 24 in., 28 in.
Screw Machines, Nos. 1, 2, 3, 4, with or without Wire Feed.
Screw Machines, Nos. 5, 6, 7, 8, Power Feed.
Presses, Nos. 51, 52, 53, Ferracute; Nos. 1, 2, 3, Stiles & Parker.
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Hand Millers, Nos. 1 and 2. 3 Cam Cutters.
Bolt Cutters, ¼ in. to 1 in., ½ in to 2 in.
2 Profiling Machines. 1 36 in. and 48 in. Gear Cutter.
C. D. and E. Horizontal Boring Machine. Newark Machine Tool Co.
Send for List of New and Second-Hand Machinery in Stock.
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Platinum in sheet and wire, all sizes, and any degree of hardness. Scrap and native platinum purchased.

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WRITE FOR QUOTATIONS.
Prompt Shipment and Low Prices Guaranteed.
W. R. MASON, General Manager.

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THE JOHNS-PRATT CO.
(MANUFACTURERS of MOULDED MICA)
Composed of Asbestos, Combined with Water and Acid-Proof Materials, Compressed and Vulcanized,
FOR ELECTRICAL PURPOSES,
Switchboards, Armature Sleeves, Battery Cells, Insulating Washers, Insulating Parts for Arc Lights, Incandescent Lights, Motors, Chandeliers, Dynamos, etc.
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Special Styles and Shapes to Order. Prices on Application.
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